CANCELLED
Class Q62
Book A67
v16
CANCELLED

COND. A.D. 1895.

CANCELLED

CANCELLED CANCELLED CANCELLED

Library of Fairmount College,
Wichita, Kansas.

17302

P
Med
A

ARCHIVES

OF

OPHTHALMOLOGY

EDITED IN ENGLISH AND GERMAN

BY

DR. H. KNAPP
OF NEW YORK

AND

DR. C. SCHWEIGGER
OF BERLIN

DR. F. E. D'OENCH
OF NEW YORK
ASSISTANT EDITOR

VOLUME XVI.

417135
28. 10. 43

NEW YORK
G. P. PUTNAM'S SONS, 27 & 29 WEST 23D STREET
LONDON: 27 KING WILLIAM STREET, STRAND
WIESBADEN: J. F. BERGEMANN'S Verlag
PARIS: J. B. BAILLÈRE, 19 Rue Hautefeuille
1887

RE
1
A74
v.16

COPYRIGHT BY
G. P. PUTNAM'S SONS
1887

Press of
G. P. Putnam's Sons
New York

CONTENTS OF VOL. XVI.

NUMBER I.

PAGE

1. Contributions to the Knowledge of Glaucoma. By Prof. J. Schnabel, of Innsbruck. Third article. Translated (abridged) by Dr. A. Barkan, San Francisco 1
2. Prolapse of the Retina into the Anterior Chamber of the Eye Following Dislocation of the Lens into the Posterior Chamber. By Dr. E. Berger, of Gratz. Translated by Dr. J. E. Weeks. (With figs. 1 and 2 of plate v. of vol. xv.) 26
3. The Cilio-Retinal Blood-Vessels. By Dr. A. Birnbacher, Graz. Translated by Dr. J. E. Weeks, New York. (With fig. 3 of plate v. of vol. xv.) 32
4. Note of a Case of Intraocular Hemorrhage Caused by a Fall on the Occiput. By A. Schapringer, M.D., New York 35
5. A New Instrument for Performing Optico-Ciliary Neurotomy. By Wm. Ellery Briggs, Sacramento, Cal. 37
6. Is the Position of Rest the Cause of Strabismus? By Dr. Edwin J. Gardiner, Chicago, Ill. 39
7. Transplantation of a Rabbit's Eye into the Human Orbit. By Charles H. May, M.D., New York 47
8. On Cataract-Extraction without Iridectomy. By H. Knapp . . 54
9. A Family History of Blindness from Glaucoma. By Dr. Lucien Howe, of Buffalo, N. Y. 72
10. Systematic Report on the Progress of Ophthalmology during the First and Second Quarters of the Year 1886. By H. Magnus, Breslau; C. Hortsmann, Berlin; and A. Nieden, Bochum; with the co-operation of C. E. Fitzgerald, Dublin; E. Marckwort and P. von Mittelstädt, Antwerp; Dantone, Rome; Hirschmann, Charkow; S. M. Burnett, Washington; Schjötz and Ole Bull, Christiania, etc. Translated by Drs. F. E. D'Oench and A. Schapringer, New York 77

    A.—Prof. H. Magnus. Text-books, monographs, treatises on general, bibliographical, and historical subjects, 77; Statistical papers, 80; General pathology, diagnosis, and therapeutics, 82; Instruments and remedies, 86; Anatomy, 89; Physiology, 91.

17302

PAGE

B.—Dr. C. Horstmann. Anomalies of refraction and accommodation, 94; Lids, 96; Lachrymal apparatus, 100; Muscles and nerves, 101; Orbit and neighboring cavities, 106; Conjunctiva, cornea, sclera, anterior chamber, 112.

C.—Dr. A. Nieden. Iris, 121; Choroid, 122; Glaucoma, 123; Sympathetic ophthalmia, 127; Lens, 129; Vitreous body, 133; Retina and functional disturbances, 134; Optic nerve, 141; Injuries, foreign bodies, and parasites, 142; Ocular affections in constitutional diseases, 143.

11. Miscellaneous Notes 147

NUMBER 2.

1. The Anomalies of the Ocular Muscles. By Dr. George T. Stevens, New York. First Paper—Hyperphoria 149

2. A New Operation for Distichiasis or Entropion, with the Record of a Few Cases. By W. F. Smith, M.D., Chicago, Ill. (With three illustrations.) 177

3. Case of Transplantation of the Rabbit's Eye, with Subsequent Enucleation. By H. W. Bradford, M.D., Boston, Mass. . . 182

4. Glaucoma Simplex (on Both Sides) in a Child Eleven Years of Age. Reported by R. L. Randolph, M.D. 185

5. Report on a Series of Five Hundred Successive Cases of Enucleation of the Eyeball, Compiled from the Record Books of Dr. Knapp's Practice at Heidelberg and New York. By Dr. F. E. D'Oench, of New York 187

6. Cocaine in Glaucoma. By Elizabeth Sargent, M.D., of San Francisco 205

7. Tolerance of Foreign Bodies in the Orbit and the Eye. A Few Cases Reported in Illustration. By Dr. W. W. Gardner, of Springfield, Mass. 207

8. Clinical Communications. By Geo. Reuling, of Baltimore. I.—Cyst of Iris Destroyed with the Galvano-Cautery. II.—Syphiloma at the Sella Turcica Causing Engorged Papilla and Ending in Complete Recovery. III.—Granuloma Sarcomatosum Corneæ of Seven Years' Standing 210

9. Systematic Report on the Progress of Ophthalmology during the Third Quarter of the Year 1886. By H. Magnus, Breslau; C. Horstmann, Berlin; and A. Nieden, Bochum; with the co-operation of C. E. Fitzgerald, Dublin; E. Marckwort and P. von Mittelstädt, Antwerp; Dantone, Rome, Hirschmann, Charkow; S. M. Burnett, Washington; Schjötz and Ole Bull, Christiania, etc. Translated by Dr. F. E. D'Oench, New York . . . 217

A.—Dr. H. Magnus. Text-books, monographs, treatises on general, bibliographical, and historical subjects, 217; Statistical papers, 219; General pathology, diagnosis, and therapeutics, 220; Instruments and remedies, 221; Anatomy, 222; Physiology, 223.

B.—Dr. C. Horstmann. Anomalies of refraction and accommodation, 227; Lids, 228; Lachrymal apparatus, 229; Muscles and nerves, 229; Orbit and neighboring cavities, 231; Conjunctiva, cornea, sclera, anterior chamber, 233.

PAGE

C.—Dr. A. Nieden. Iris, 236; Choroid, 237; Glaucoma, 238; Sympathetic ophthalmia, 238; Lens, 239; Retina and functional disturbances, 240; Optic nerves, 242; Injuries and foreign bodies (parasites), 243; Ocular affections in constitutional diseases, 244.

10. Reviews 248

A Practical Treatise on Diseases of the Eye. By Dr. Éduard Meyer.
A Theoretical and Practical Treatise on Astigmatism. By Swan M. Burnett.

11. Miscellaneous 251

NUMBER 3.

1. The Operations for Primary and Secondary Cataracts. By Dr. C. Schweigger. Translated by Dr. Cornelius Williams, Saint Paul, Minnesota 253

2. Two Cases of Vertical Nystagmus. By F. E. D'Oench, M.D. . 291

3. An Instrument for Testing Refraction and Its Errors, the Strength of the Recti Muscles, and Their Insufficiency. By Ward A. Holden, A.M., M.D., Cincinnati, Ohio 295

4. Amyloid in the Cornea of a Staphylomatous Eye. By Dr. O. Beselin. Abridged and translated by H. Knapp. (With plates iii. and iv.) 313

5. On Co-Excitation in the Regions of Homonymous Visual Fields. By Dr. A. Schiele. Abridged and translated by H. Knapp. (With six lithographic plates, v.–x.) 317

6. Systematic Report on the Progress of Ophthalmology during the Fourth Quarter of the Year 1886. By H. Magnus, Breslau; C. Horstmann, Berlin; and A. Nieden, Bochum; with the coöperation of C. E. Fitzgerald, Dublin; E. Marckwort and P. von Mittelstädt, Antwerp; Dantone, Rome; Hirschmann, Charkow; S. M. Burnett, Washington; Schjötz and Ole Bull, Christiania, etc. 322

A.—Dr. H. Magnus. Text-books, monographs, treatises on general, bibliographical, and historical subjects, 322; Statistical papers, 323; General pathology, diagnosis, and therapeutics, 325; Instruments and remedies, 326; Anatomy, 328; Physiology, 331.

B.—Dr. C. Horstmann. Anomalies of refraction and accommodation, 333; Lids, 336; Muscles and nerves, 337; Orbit and neighboring cavities, 340; Conjunctiva, cornea, sclera, anterior chamber, 342.

C.—Dr. A. Nieden. Iris, 346; Choroid, 347; Glaucoma, 348; Sympathetic ophthalmia, 350; Lens, 351; Vitreous, 354; Retina and functional disturbances, 355; Optic nerve, 358; Injuries (foreign bodies) and parasites, 358; Ocular affections in constitutional diseases, 360.

7. Reviews 68

A Treatise on Simple and Compound Ophthalmic Lenses. By Chas. F. Prentice.
Compend of the Diseases of the Eye. By Dr. L. Webster Fox and George M. Gould.

8. Ferd. von Arlt. Obituary by Dr. C. Horstmann. Translated by H. Knapp. 370

NUMBER 4.

PAGE

1. Bacteriological Investigation of the Antiseptics Used in Ophthalmology. By Dr. John E. Weeks, New York 375
2. On Ocular Symptoms Due to Nasal Disease. By Dr. H. Gradle, Chicago 391
3. A New Instrument for Testing Insufficiencies of the Recti Muscles. By Ward A. Holden, A.M., M.D., Cincinnati, Ohio . . . 403
4. The Actual Cautery in the Removal of Neoplasms from the Eye, with a Case. By B. L. Millikin, M.D., Ophthalmic and Aural Surgeon to Charity Hospital, etc., Cleveland, Ohio . . . 409
5. On the Connection between Diseases of the Eye and Nose. By Dr. Adolph Nieden, of Bochum. Translated and abridged by Dr. J. A. Spalding, of Portland, Maine 415
6. A Contribution to Tuberculosis of the Eye. By Dr. Ernest Neese, of Kiew, Russia. Translated by Dr. James A. Spalding, Portland, Maine. (With plates xi. and xii. of vol. xvi.) 434
7. The Pathogenesis of Glaucoma. By Professor J. Stilling, M.D., of Strassburg. Translated (abridged) by H. A. B. MacCauley, M.D., New York. (With plate xiii.) 440
8. The Return to the Flap-Operation. By Professor C. Schweigger, of Berlin. Translated by H. A. B. MacCauley, M.D., New York, 447
9. Systematic Report on the Progress of Ophthalmology during the First Quarter of the Year 1887. By H. Magnus, Breslau; C. Horstmann, Berlin; and A. Nieden, Bochum. With the co-operation of C. E. Fitzgerald, Dublin; E. Marckwort, Antwerp; P. von Mittelstädt, Metz; Dantone, Rome; Hirschmann, Charkow; S. M. Burnett, Washington; Schjötz and Ole Bull, Christiania, etc. Translated by F. E. D'Oench, M.D., New York . 456
   - *A.*—Dr. H. MAGNUS. Text-books, monographs, treatises on general, bibliographica., and historical subjects, 456; Statistical papers, 457; General pathology, diagnosis, and therapeutics, 458; Instruments and remedies, 459; Anatomy, 463.
   - *B.*—Dr. C. HORSTMANN. Anomalies of refraction and accommodation, 464; Lids, 465; Lachrymal apparatus, 467; Muscles and nerves, 467; Orbit and neighboring cavities, 468; Conjunctiva, cornea, sclera, anterior chamber, 471.
   - *C.*—Dr. A. NIEDEN. Iris, 477; Choroid, 478; Glaucoma, 479; Sympathetic ophthalmia, 480; Lens, 481; Vitreous, 486; Retina and functional disturbances, 486; Optic nerve, 488; Injuries (foreign bodies) and parasites, 488; Ocular affections in constitutional diseases, 489.
10. Reviews 493
    - Reference Hand-Book of the Medical Sciences. Edited by A. H. Buck, M.D.
    - On the Determination of the Necessity for Wearing Glasses. By D. B. St. John Roosa, M.D.
    - Granular Lids and Contagious Ophthalmia. By W. F. Mittendorf, M.D.
11. Miscellaneous News 494

UNITED STATES ARMY MEDICAL DEPARTMENT

VOL. XVI. No. 1.

ARCHIVES OF OPHTHALMOLOGY.

CONTRIBUTIONS TO THE KNOWLEDGE OF GLAUCOMA.

By Prof. J. SCHNABEL, of Innsbruck.

THIRD ARTICLE.[*]

Translated (abridged) by Dr. A. Barkan, Prof. Ophthalmology, Cooper Medical College, San Francisco.

THE first two parts of this treatise contain the *résumé* of a number of anatomical investigations, intended to prove that the clinical picture of glaucoma and the obliteration of the sinus of the chamber do not necessarily go hand in hand. The whole surface of the iris may be attached to the cornea, and yet no glaucoma be present. Obliteration of the sinus is frequently observed in eyes of normal tension, and even in eyes evidencing temporary decrease of tension. Authors advocating the theory of obliteration have thus far not attempted to explain why the annular adhesion may sometimes cause glaucoma and at other times fail to do so. As to the opinion entertained by Knies, that iridectomy cures glaucoma, not by excision of the iris, but by the scleral cut, the cicatrix of which allows filtration of aqueous humor, I have shown before that excision of the iris is by no means an indifferent item in the cure of glaucoma, and I now maintain that whilst some scars from iridectomy are broad and yielding, thus allowing the exit of fluid from the chamber beneath the conjunctiva, it is just as certain that most of the scars met with after iridectomy are firm and impermeable to fluid. Cases exceptionally exhibiting the above-mentioned condition of the cicatrix are considered as poorly healed, and cannot possibly account for the usual regular effects of iridectomy. We know that glaucoma may be healed by iridectomy, and yet the annular adhesion persists unchanged in the sinus of the chamber; we likewise know that the cicatrix after iridectomy does not serve as a compensatory exit for the humors of the eye. This knowledge, however, does not entirely overcome the theory of obliteration. Iridectomy may produce conditions of a kind hitherto unknown, divesting of its evil consequences the obliteration of the sinus. It now becomes necessary to ascertain whether Weber's theory, that increased tension in glaucoma can be caused only by obliteration of the sinus of the chamber, cannot be proved incorrect. In order to avoid mistakes the terms *secretion* and *excretion* of the humors of the eye will be substituted by the terms *infiltration* and *exfiltration.* The aqueous humor passes into the venous channels by means of filtration, the tension of the eye acting as a filtration pressure on their exterior walls, whilst their interior walls are acted upon by the blood pressure, which is much less in this part of the vascular system than in the one where the eye liquid enters the ocular cavity. As soon as the tension of the eye has reached a certain height, it will force liquid from the interior of the eye into the venous channels. The exit of a certain amount of fluid diminishes the tension of the eye, and by thus disturbing the equilibrium between arterial blood pressure and tension of the eye, *infiltration* is caused. This again changes the former equilibrium between the pressure in the eye and that in the veins, and thus new *exfiltration* arises. As a natural consequence the exit of a certain quantity of fluid is followed by the entrance of an equally large quantity of fluid, and *vice versa.*

---

[*] The first article was published in vol. vii., pp. 12–38, and pp. 243–261. The second article in the same vol., pp. 262–310.

It has been frequently stated that the increase of eye pressure must be due only to the increase of the *in-going* supply, without a compensating change in the *out-coming* supply, or in the diminution of the efflux without change of the influx, or finally to an increase of the influx with simultaneous decrease of the efflux. Not one of these suppositions is met with in cases of permanent increase of ocular pressure.

Each increase of the inward flow promotes the outflow, each decrease of the latter checks the inward current; a lasting increase of the inward current, with simultaneous decrease of the outward current, does not really exist. The equilibrium between the inward supply and the outward flow exists equally in eyes of normal, increased, or decreased tension; it is dependent upon the force of blood pressure in the circulus arterius major (which supplies the arteries of the ciliary processes), and with it must be either normal, super-, or sub-normal. There certainly exist special contrivances in the normal eye for maintaining the ocular tension at a certain height. These are identical with the arrangements serving to preserve at a medium height the pressure in the ciliary processes, which secrete the intra-ocular fluids.

We cannot agree with Weber's theory, which maintains that increase and decrease of tension are caused by disturbances in the relative quantity of secretion and excretion, for the intra-ocular pressure acts on the one hand as a hindrance to infiltration, and on the other hand is a propelling power for exfiltration—an increase or decrease of the intra-ocular pressure will consequently increase, or respectively decrease, the resistance to infiltration, just as much as the propelling power for exfiltration. Blood pressure is the source of the intra-ocular pressure, and regulates also the circulation of the intra-ocular fluid. For example, a man of thirty-eight years of age exhibited on the left side a narrow palpebral fissure, small pupil, decreased tension, normal vision, refraction, and accommodation; this condition had existed for thirty-three years, and was due to a fall. The patient stated that for over twenty years he had been aware that whenever he exerted himself bodily the left half of his face always remained cool and dry, whilst the right half became hot, and the perspiration ran down it. Decreased tension was therefore a symptom of paresis of the sympathetic nerve on the left side, existing over thirty years. Weber's theory of the mechanism which regulates the intra-ocular tension is entirely insufficient to explain the decrease of tension. Observations, which can be made daily, sufficiently contradict that opinion. After puncture the anterior chamber is quickly refilled, till the eye has the same tension it before possessed. As much fluid will enter the normal eye as will be required to bring the tension to the normal degree, whereas a greater, or relatively a smaller, amount of fluid will enter an eye the tension of which had previously been increased or decreased. Why does the hypotonic eye not fill after puncture to the same extent as the eye of normal tension? The entrance of a few drops into the interior of the eye would accomplish this. The condition of the eye with respect to circulation, number of blood-vessels, etc., is sound. Why does not the quantity of fluid rise farther in a punctured eye of normal tension, after the medium tension of the eye has been again reached? We well know that the tension is so moderate that it will allow the finger easily to dimple the eyeball, and the sclerotic of a normal eye, especially in the young, would, without difficulty accommodate a larger quantity of fluid than it really does. The answer to all these questions is: That the tension of the coats of the eye can rise to the point, only, when the intra-ocular pressure counterbalances the arterial blood pressure in the ciliary processes—to this point, however, it is bound to rise. The real reason of the maintenance of a medium degree of pressure in the normal eye having been ascertained, we may hope to arrive at an understanding of the anomalies of tension—not only of hypertonic, but likewise of hypotonic, tension. Having reached this point, I desire to direct attention to the results arrived at in the first two parts of this treatise. It was then shown that glaucoma may be present without obliteration of the sinus of the chamber; and that the latter can exist without glaucoma; finally, that glaucoma can be cured without the obliteration of the chamber sinus being removed. This proves the incorrectness of the obliteration theory.

I shall now proceed to examine to what extent the theoretical deductions mentioned before are corroborated by clinical and anatomical experiences gathered from eyes of abnormal tension, and whether the latter can be traced back to anomalies of tension in the sphere of blood-vessels composing the circulus arteriosus major.

To those who maintain that choroiditis, proceeding with hypersecretion, is the cause of glaucomatous hypertension, we would not only reply that the signs of an inflammatory tissue affection are wanting, but also that, in accordance with former deductions, hypersecretion into the eye, through a lessening of filtration resistances, will necessarily cause excess of exfiltration, and thus cannot alone explain the increased tension. The supposition of a latent choroiditis to support the theory of hypertension, is arbitrary and valueless. Inflammatory affections of the anterior parts of uveal membrane, which receives its blood supply from the long posterior ciliary arteries, proceed sometimes with normal tension, rarely with hypertension, very often with hypotension. The diminution in the filtration resistances, caused by the inflammatory affection of the walls of the blood-vessels, far from causing hypersecretion, do not prove even sufficient to prevent hypotension. From this, it follows that the disturbance which causes hypertension, must not be looked for in an inflammatory disease; we must, on the contrary, suppose that hypertension in an inflamed eye is not the direct consequence of inflammation, but a complication of the same, caused by circumstances of a particular kind. Light is thrown on this point by cases where anomalies of tension are present without any inflammatory disturbances in the vascular sphere of the long ciliary arteries. In typical cases of this sort, disturbances are to be found in the innervation of the blood-vessels of the iris, which, in otherwise perfectly healthy eyes, are met with as a *symptom of paralysis and irritation of the cervical portion of the sympathetic nerve. These cases teach us that paralysis of the arteries of the iris, and myosis resulting from the same, go hand in hand with hypotension, whereas, irritation of the arteries of the iris and mydriasis stand in connection with hypertension; they serve as incentives to discussions of the question, in which way filtration-pressure in the arteries of the ciliary processes may be influenced by the size of the arteries of the iris as found at various times.*

In paralysis of the arteries of the iris, their walls relax and stretch; owing to irritation of the cervical sympathetic, they get narrower and quite tortuous. The speed of the current in the blood of the iris will increase in the first, and decrease in the second case. In consequence of this, the amount of blood and blood pressure in those arteries taking their origin in the circulus arteriosus major of the iris—that is, in the arteries of the ciliary processes—will sink in the first case, and rise in the second. Consequently, *paralytic myosis will produce hypotension, and spasmodic mydriasis will produce hypertension.* Höltzke's researches corroborate this, for he found that the pressure in the anterior chamber of living animals, under certain physiological conditions (that is, without atropia or eserine instillation), rises with the dilatation of the pupil, and falls when the pupil contracts. The same author observed several times a slight fall of the pressure-gauging quicksilver column simultaneously with the contraction of the pupil. He also ascertained in one of his experiments, when the sympathetic nerve had been previously cut, a sinking of the pressure to the extent of three to eight *mm*, whenever the pupil of slightly more than medium size was contracted *ad maximum* by light. As already stated on a former occasion, I have convinced myself by palpation, that eserine decreases not only the tension of an eye affected by hypertension, but also that of an eye with normal tension. Höltzke states that atropia increases the pressure considerably in the anterior chamber, by enlarging the pupil. A pressure-bandage, firmly applied, quickly and thoroughly contracts the pupil, and diminishes the ocular pressure in a very striking manner. So does massage, probably in a similar manner to the bandage, by paralyzing the blood-vessels of the iris by pressure. Warmth, also long-continued applications of cold to the eye, have a relaxing influence upon the blood-vessels of other parts of the body. Myosis and mydriasis act in a similar way, when met with as symptoms in inflammatory diseases of the anterior part of the eye. The former is associated with *hypotension;* the latter, with *hypertension.* The connection existing between myosis and hypotension is also clearly demonstrated in those every-day cases where a foreign body is superficially lodged, producing irritation of the sensitive corneal nerves and reflex enlargement of the blood-vessels of the iris. The influence which the size of the pupil exerts upon the blood pressure in the arteries of the ciliary body, may explain the beneficial effect of sleep upon eyes that have been suffering from a slight glaucomatous attack, and likewise the influence exerted by some emotions, such as fright, in increasing tension and enlarging the pupil.

Thus it is shown by clinical observations that a regular connection exists between hypertension and paralysis on one hand, and hypertension and irritation of the cervical sympathetic on the other. This is corroborated by experimental excitation of the cervical sympathetic, which, according to Adamück, produces hypertension.

Whilst some authors consider glaucomatous hypertension as essentially different from that hypertension which is observed as a part of non-glaucomatous affections, others look upon the symptoms of hypertension as characteristic of and identified with glaucoma. Those symptoms which we find in connection with hypertension in glaucomatous eyes, and which are lacking where hypertension occurs in non-glaucomatous eyes, teach us that those symptoms are not mechanical consequences of hypertension, but are symptoms of a glaucomatous affection, as may be also inferred from those cases where, notwithstanding the presence of exquisite glaucomatous symptoms, hypertension is either entirely wanting, quite insignificant, or only of temporary duration. Hypertension is a very important symptom of glaucoma, but does not belong to it exclusively. To identify increased tension with glaucoma, means about the same as the equalization of part of a sum with the sum total; to include all affections proceeding with increased eye-ball tension under the term of glaucoma, means the same as equalization of different sums, because they form one part of the sum total in common. Hypertension of non-glaucomatous eyes disappears completely of itself. Hypertension of glaucomatous eyes disappears only to return after a while, and having lasted a longer time, exhibits only, as a rule, variations of intensity, without entirely disappearing. The conclusion from this is that the cause of hypertension exists only for a short time in one case, and always in the other; not, however, that the acting causes are of a different nature. We have ascertained that the increased blood pressure in the arteries of the ciliary processes causes hypertension in non-glaucomatous eyes; we must logically look for the same cause as an explanation of glaucomatous hypertension. The existence of increase in this blood pressure is demonstrated, *ad oculos*, by anatomical investigations. Whilst it appears probable that active dilatation of the blood-vessels in the ciliary processes, caused by irritation of the vaso-dilatory nerve branches, has at times a prominent share in promoting hypertony, yet in by far the greatest number of glaucoma cases the increase of blood pressure in the circulus arteriosus major and in the blood-vessels of the ciliary processes is undoubtedly due to an affection of the iris.

Let us now direct our attention to the glaucomatous symptoms occurring in the anterior part of the eye, and first consider the changes met with in the iris. Having felt obliged to designate these already, as the causes of increased tension (an important deviation from the modern theory of glaucoma,) I must state my reasons for so doing.

There exists an unmistakable parallelism between the development of mydriasis and that of hypertension. If the latter be absent in glaucoma, or exist only in a slight degree, and be of short duration, then mydriasis is wanting; in chronic glaucoma with continued though moderate hypertension, mydriasis attains only a moderate degree; if glaucoma develops very acutely, and is marked by sudden and great hypertension, it will be found, as a rule, that mydriasis reaches likewise quickly a high degree; in the so-called premonitory stage, mydriasis is observed to develop with each attack of hypertension, and to pass away with it. There exists, therefore, a very intimate, possibly a causal, connection between hypertension and mydriasis. I shall demonstrate that mydriasis must necessarily become the cause of hypertension, and will have to show first that hypertension cannot be the cause of mydriasis, as maintained by the pressure hypothesis.

The iris possesses nerve fibres which contract the pupil; others which dilate it. Pressure, which paralyzes the first, ought to do the same with the others; a perfectly immovable pupil, *not* a steadily growing mydriasis, ought to be the consequence. It will also be conceded that hypertension should have had some time to act upon the nerve fibres of the sphincter previous to paralyzing them. But hypertension and mydriasis often appear simultaneously. The size and shape of the pupil differ in most cases of acute glaucoma, decidedly so in paralysis of the oculo-motor nerve. Von Graefe knew of two causes for mydriasis: pressure on the nerve fibres contracting the pupil, and progressive atrophy of the iris. This second cause, atrophy of the iris tissue, is only mentioned incidentally, although its existence is undoubted, and explains the characteristic form of the pupil as observed in many cases of glaucoma. As the iris contracts, the pupil expands; the waste of tissue does not extend uniformly over the whole iris, consequently the enlarged pupil must be irregular in shape, and eccentric. That part of the iris which has the most receded from its normal position, always exhibits the greatest defect in its tissue. As it seems impossible to explain mydriasis, we are compelled to look upon it as a consequence of iris atrophy. Mydriasis is not an independent symptom of glaucoma; it is contained in the glaucomatous atrophy of the iris. The mydriasis, however, which appears suddenly in acute glaucoma, and the one liable to disappear during the premonitory stage, cannot at all, or, at least, only partially, be explained by atrophy of the iris. The pressure-paralysis of the sphincter nerves being likewise an insufficient explanation, we arrive by mere exclusion at the result that the development of these inflammatory and transitory forms of glaucomatous mydriasis arises from excitation of the nerve-fibres enlarging the pupil. In conformity with this are the three symptoms:—enlargement of the pupil, increase of tension, and decreased sensibility of the cornea occurring in glaucoma, met with also in cases of pathological excitation of the cervical sympathetic, and in experimentally produced excitation of the intra-ocular fibres of the sympathetic by instillation of cocaine. Glaucomatous mydriasis is at times produced by glaucomatous atrophy of the iris, at other times by excitation of the nerve fibres enlarging the pupil, and sometimes both factors co-operate.

The tissue-changes of the iris affected with glaucomatous degeneration, recognizable with the naked eye, are the narrowing and thinning of the iris, discoloration and new formation of pigment; the walls of its arteries are thickened, they assume a white color, the veins become distended and their walls thinned. Consequent on the narrowing of the margin of the iris, the circulus arteriosus minor borders sometimes closely on the pupillary edge. Consequent upon the thinning of the iris, its front surface becomes in places uncommonly smooth, groove-like indentations are formed, and the blood-vessels exposed. Discoloration shows itself by the paling of the whole of the iris, and scattered slate- or lead-colored spots are seen in the ciliary region. The white prominent walls of the arteries present a striking appearance, particularly in very fresh cases of acute glaucoma, whilst the enlarged veins are easily recognizable in older cases of so-called inflammatory glaucoma. The glaucomatous affection of the iris may be developed insidiously or stormily. Sometimes it proceeds steadily, at other times by fits and starts, towards higher and higher degrees of degeneration. But the glaucomatous iris does not at any stage of its development exhibit the characteristics of a new formation of tissue, of increase of substance; on the contrary, the symptoms of degeneration predominate, even in the most acute course. The glaucomatous affection of the iris may have reached its highest degree, yet the eye may never have been very red or painful, neither are any traces of new formation of inflammatory origin found at the pupillary margin or in the pupillary area. The iris of a glaucomatous eye shows from the very beginning disturbances only of circulation, and atrophy. All changes to be observed during years of progressive glaucomatous affection of the iris, always belong to these two categories of disturbed circulation and atrophy of tissue ; the process of disease even cannot be considered under the head of inflammation, although accompanied by pain, ciliary injection, and the exit of white and red blood-corpuscles into the tissue of the iris. The walls of the iris arteries lose their elasticity and their lumen is narrowed by hyaline degeneration and thickening. From this results, on the one hand, insufficient nutrition and atrophy of the tissue of the iris, and, on the other hand, increase of pressure on, and enlargement of, the circulus arteriosus major, and of the blood-vessels of the ciliary processes, leading to increase of intra-ocular pressure. But even the highest degree of irritation in mydriasis, the very acute development of which I have observed in hysterical individuals, do not produce glaucoma, only hypertension in a considerable degree, which disappears spontaneously after a while.

In seeming contradiction to this observation is the well-known fact, that the instillation of a weak mydriatic, a very weak solution of atropia, or a drop of homatropine, into an apparently healthy eye, may be followed by the outbreak of acute glaucoma ; whilst much stronger mydriatic agents will be tolerated by an immense number of other eyes without their experiencing any injury. We are thus obliged to suppose that in the eyes of the first class, degeneration of the iris, peculiar to glaucoma, is already developing, though so slowly, or with such slight intensity, that no striking clinical symptoms of glaucoma had as yet been evidenced. If we consider further, that premonitory attacks of glaucoma are produced by fright, serious excitement, great hunger, and may be obviated by quiet, sleep, appeasement of hunger, there will be little reason to doubt that glaucomatous hypertension may be produced by excitation of the fibres of the sympathetic enlarging the pupil and vaso-contracting nerves of the iris arteries. This mydriasis, due to excitation, needs a predisposed soil to cause an attack of glaucoma, and this predisposition is caused by the condition of hyaline degeneration in the arteries of the iris. The changes in the anterior part of the eyeball, the increased pressure in chronic, painless, steadily advancing cases of glaucoma, where ciliary injection, œdema of the subconjunctival tissue, etc., are entirely wanting, may be fully understood by presupposing a glaucomatous degeneration of the arteries of the iris; glaucomatous attacks imperatively demand the supposition of a condition of excitation, which comes on very abruptly, affecting the contracting fibres of the sympathetic which supply the arteries of the iris. As a consequence of simple excitation of the sympathetic, mydriasis, hypertension, and decreased sensitiveness of the cornea are observed, but no glaucoma; we are therefore compelled to presuppose the same predisposition, caused by insidious development of hyaline degeneration of the walls of the iris arteries, in cases of acute and fulminant glaucoma, as well as in the premonitory attacks and in atropine glaucoma.

Thus far the glaucoma symptoms observed are those exhibited in the anterior part of the eye. Different as are the organs of that part, not a single one remains intact. Sclera and cornea, iris and corpus ciliare, lens, aqueous and vitreous humors, all become affected, owing to disturbances of circulation and their consequences. The long and the anterior ciliary arteries are the seat of those long continued disturbances of circulation, which are met with in the bloodvessels of the iris and have two causes; the one developing slowly, increasing steadily, and acting uninterruptedly—viz., the hyaline degeneration of the arterial walls; the other setting in suddenly, attaining rapidly to a high degree, and producing only a passing effect, is the spasmodic contraction of the blood-vessels. Hyaline degeneration of the walls of the arteries cannot be removed, only checked, by therapeutics. Spasm of the blood-vessels is amenable to cure. It is often removed by eserine, pilocarpine, and morphine, by sleep, food, chloroform-narcosis, and inhalation of nitrite of amyl. Although these remedies will not prevent recurrences of the spasm, iridectomy, and sometimes sclerotomy, will effectually do so. Thus, taking into consideration that an operation cures the attack of glaucoma; that it not only prevents a return of similar attacks, but causes also a cessation of the further progress of hyaline degeneration of the arteries of the iris, we are obliged to suppose that this procedure removes the excitation of the vaso-constrictor nerves of the iris, and thus indirectly checks the process of degeneration.

Let us now examine the group of glaucomatous symptoms found around the optic disc. We shall do so inductively, and without reference to what we have ascertained already; but will make an independent examination as to the connection and development of those symptoms.

A fact primarily to be considered is, that in a very great number of cases of glaucoma a peculiarly formed excavation follows the condition of the pathological hypertension. The question arises—How is the excavation developed? To which the pressure theory replies: By overburdening of the papilla the surface—presuming, at the same time, that the lamina cribrosa is unable to resist the intra-ocular pressure, which has become pathologically increased. This hypothesis is applicable only to a majority of all cases of excavation, and the theory of a lack of resisting power on the part of the lamina cribrosa is merely an unproved supposition. Respecting those refractory cases of excavation which proceed without increase of tension, it has been asserted that the increased intra-ocular pressure was really acting, therefore existing, but could not be demonstrated. This is an arbitrary and forced supposition.

We have been unable thus far to explain the process by which the cornea is rendered unable to resist normal pressure in the formation of keratoconus; yet no one has found any cause for protesting against the supposition that keratoconus is due to a peculiar softening process. The cornea is bulged forward—this constitutes one fact; at the same time the pressure remains normal—this is the second fact; and that even at the greatest height of intra-ocular pressure the cornea does not bulge out, constitutes the third fact. One is thus bound to arrive at the conclusion that keratoconus is due to a decreased power of resistance in the cornea. At times the papilla becomes excavated by normal pressure; the excavation of the papilla is also sometimes wanting, although the intra-ocular pressure is at its highest; why not suppose that this is also due to the loss of local power of resistance? Our ignorance of the process of softening in the cornea, which is transparent, is more surprising and disturbing than in the case of the papilla. I fail to understand why the morphological connection of the glaucomatous as well as the non-glaucomatous excavations of other parts of the walls of the eyeball should be entirely disregarded, and why the cause for formation of the first should not be sought, where it has already been recognized in the last. By supposing that the glaucomatous excavation of the papilla, like all other excavations, is caused by a local process of softening in the tissue, opposition against a series of undoubted facts becomes unnecessary, in support of the supposition that the lamina cribrosa is unable to afford resistance to the undoubted increase of intra-ocular pressure; neither will it be necessary to exclude diseases of an undoubtedly glaucomatous nature from the group of glaucoma, nor to maintain that intra-ocular pressure is increased, when it cannot be demonstrated by the most conscientious examination. Had the pressure theory been superseded by von Jaeger's views of the glaucomatous optic-nerve affection, it would have been necessary to trace the peculiar features of the disease to the inexplicable qualities of a process in and around the optic nerve, the nature of which is at present unexplained. All knowledge concerning the glaucomatous affection of the optic nerve is exceedingly uncertain—in reality, not much more than an indispensible postulate. I have become firmly convinced, however, that it is by no means rarely present previous to increase of tension. The interesting question next arises, whether the head of the optic nerve of the seeing glaucomatous eye is excavated, as we are led to believe from an ophthalmoscopic examination, or whether, as stated by Mauthner, it is of a normal shape and transparency, and has become invisible. So far as those cases of excavation are concerned which I have seen, I must state that, without a single exception, I have found Mauthner's statement incorrect. The mass of nerve fibres is to be seen in the glaucomatous excavations between the blood-vessels, between them and the optic-nerve sheath, behind the blood-vessels on the floor of the excavation and in the gaps of the lamina cribrosa; and it appears to me absolutely certain that Mauthner's opinion concerning the complete absence of nerve fibres in the central cavity is a mistake, and is caused by an erroneous supposition. The excavation, which is the second important symptom of the glaucomatous optic-nerve affection, certainly does exist. I had occasion to observe the conditions under which it developed in a case of fulminant glaucoma of both eyes, where glaucomatous excavations exhibited themselves only after successfully performed iridectomies. In this accurately observed case, (fully described in the German edition—Tr.), loss of transparency and a dirty-reddish discoloration of the papilla preceded the commencement of the glaucomatous change in the shape of the papilla; this was accomplished by the narrowing of the single parts of the ring of nerve fibres and a sinking in of its anterior surface. The glaucomatous optic-nerve ring was still wanting when the glaucomatous excavation was completely formed; within eight days subsequently it was nearly completely developed. During the whole time in which the excavation and the optic-nerve ring were forming, the lamina cribrosa did not show the slightest change in position. The formation of the excavation commenced eight days, and the formation of the ring twenty-five days, after the iridectomy. Whilst the excavation was developing, the tension remained normal and the lamina cribrosa unchanged in its normal position. Vision and field of vision improved steadily. The most important deduction from this observation is the following: The excavation, even in eyes suffering from glaucoma, with highest increase of tension, is due to a peculiar affection of those parts of the optic nerve which are situated between the lamina cribrosa and the level of the retina. Like the glaucomatous discoloration, this affection is independent of hypertension, is rooted in the optic nerve itself, occurs only as a part of the glaucomatous disease, and therefore deserves a name of its own, for which we must retain the one given by Jäger: "*glaucomatous optic-nerve affection*," as long as a thorough anatomical research does not enable us to use a more characteristic one. The glaucomatous excavation is not a pressure excavation ; hypertension helps only to develop it quicker and to a higher degree. The receding of the lamina cribrosa is not a necessary supposition for the development of glaucomatous excavation. The latter is due to shrinkage of the elements of the connective tissue of the optic-nerve head.

Although the optic-nerve ring is an affection of the choroid, v. Jaeger added it to the symptoms of disease of the glaucomatous optic nerve, owing to its unmistakably regular connection with the glaucomatous changes of color and shape of the optic nerve. Together with these changes, this symptom is found to be best developed when hypertension is present ; it is sometimes observed previous to the excavation, and at times is developed with it, without a receding of the lamina cribrosa—the tension of the eye being normal ; I cannot agree with v. Jaeger in considering the yellowish color of the ring a regular attribute of the same. I have seen it to be blackish-gray and grayish-white ; and it is caused by a simple progressive atrophy of the corresponding zone of the choroid. The quickness of its development in the case before mentioned seems very remarkable, as it is well known that Schweigger found the choroid changed within the circle of the glaucomatous optic-nerve ring into a much thinned, transparent membrane. The choroid was ossified within that ring in a case I examined.

The anatomical condition of the glaucomatous optic-nerve affection is yet unknown. The clinical aspect is made up of the three symptoms just mentioned, and may be included under two categories, viz.: disturbed circulation and atrophy. To the first belong the redness, observable at the beginning, and the subsequent paling of the disc of the optic nerve ; to the latter belong the progressive atrophy of the supporting tissue which holds together the nerve fibres of the papilla, and the atrophy of the zone of the choroid surrounding the disc. The opinion long entertained that the compression of the optic-nerve fibres and the kinks observable on the margin of the excavation are the causes of visual impairment in glaucoma, is being gradually abandoned. Von Graefe was the first to trace impairment of the retinal function in acute glaucoma to ischæmic paralysis of the retina by suddenly developed hypertension. In order to ascertain whether the glaucomatous disturbance of circulation in the retina is produced by pathological increase of tension, we shall proceed in a similar manner to the one pursued in our investigations respecting glaucomatous mydriasis; and shall endeavor to ascertain whether the symptoms in the retinal system of blood-vessels in the glaucomatous eye are the same as those artificially produced by pressure in the healthy eye. Pressure on the surface of a healthy eyeball impedes circulation in the whole extent of the retinal blood-vessels. All the retinal blood-columns, both arterial and venous, become narrowed and flattened, the reflexes of the blood-vessels disappear or grow indistinct, those parts of the walls of the blood-vessels usually visible broaden, those usually invisible become visible, and the papilla pales.

Artificial increase of the intra-ocular pressure causes, therefore, a decrease in the whole retinal blood supply. The occurrence of the so-called arterial pulsation plainly shows a sinking of the medium pressure in the blood-vessels of the retina, so that it becomes insufficient to keep the arteries of the retina dilated during the diastole of the heart. Artificial increase of the intra-ocular pressure diminishes in a marked degree the rapidity of the current in the retinal vessels, and the column of blood in the veins breaks into red granules and then into white and red small cylinders; the movements of these granules and of the white and red cylinders, inside the lumen of the blood-vessels respectively, can be clearly observed. As far as my knowledge of literature extends, attention has not yet been directed to the phenomenon just described.

This experiment, which may be easily made at any time proves the correctness of the explanation given by v. Jaeger for this disturbance in the circulation, namely, that it is due to retardation of the blood current. Embolism of the central artery is one of the causes of such retardation. V. Arlt states that an increase in the size of the trunks of the veins, previous to their entering the field of the papilla, might be effected in a healthy eye by a moderate pressure with the finger, and therefore considers the same symptom occurring in an eye with an excavation, due to an increase of the intra-ocular pressure. I have, however, always found that, in the eye pressed upon from the outside, the veins become very distinctly narrower and flatter, not only on the papilla, but far beyond its limits, and I certainly agree in this respect with all authors who have studied the condition of the retinal blood-vessels in the eye when pressed upon. To study thoroughly the considerable, even colossal, enlargement of the retinal veins in the glaucomatous eye in which the arteries are narrowed and pulsating, such eyes should principally be examined as come under observation shortly after the first attack of acute glaucoma, when every indication of an excavation is wanting, because in these cases the suspicion may be excluded that the receding of the lamina cribrosa and the bending of the blood-vessels at the margin of the excavation have caused the anomaly in the calibre of the retinal blood-vessels. If such eyes are pressed upon, all the retinal blood-vessels become narrower; this is also the case in the normal eye when pressed upon, clearly showing that enlargement of the veins cannot be due to increase of intra-ocular pressure. Enlargement and tortuousness of the veins and abnormal redness of the papilla in the glaucomatous eye, with contracted pulsating retinal arteries, are proofs that, besides the increase of the intra-ocular pressure, there must exist another obstacle to the circulation. As the arteries are not filled and the veins not emptied to the normal extent, we must look for the obstacle in the arteries, for as the propelling power of the arterial blood is being diminished, that of the venous blood must sink, consequently the arteries become emptier and the veins fuller than in their normal condition. The obstacle to the arterial current may be caused by the interposition of abnormal resistances, or by the increase of normal resistance; by changes in the walls of the blood-vessels, by loss of elasticity and lessening of their calibre thereby; or by increased tonus of the arterial walls, and spasm of the muscles of the arteries.[1] Hemorrhages into the retina—not rarely observed, especially after acute attacks of glaucoma, and after iridectomies performed in cases of so-called acute inflammatory glaucoma—are explained by a pathological fragility of the walls, resulting from an affection of the walls of the blood-vessels.

Another important proof of the existence of serious disturbances in the retinal arteries, is presented by the occurrence of the bulging and excessive tortuousness of the small papillary veins. That this anomaly of the veins is independent of the formation of an excavation and increase of tension, has become evident to me by the observation of two cases presenting a formation of coils[2] in the small papillary veins, although excavation was entirely absent in both of them and increased tension in one. To these clinical experiences may be added the anatomical researches of v. Graefe, Poncet, and Brailey. This last author examined the retinæ of twenty-three eyes affected by primary glaucoma without hemorrhages, and found eight in which the arteries exhibited hyaline degeneration, thickening of the walls, and a diminution of their calibre amounting to complete closure, and in which the walls of the capillaries were affected by hyaline degeneration and aneurismatic enlargement. His excellent researches have proved that the cause of arterial anæmia and venous hyperæmia is the same in the retina as in the iris, and that the glaucomatous affection of the latter has its analogy in the glaucomatous affection of the former. Those glaucomatous disturbances of sight, occurring suddenly and lasting only a very short time, seem to indicate the probability of an occurrence of spasmodic contraction of the blood-vessels, and consequent ischæmia of the retina. It is insufficient to explain arterial ischæmia of the glaucomatous retina by mere increase of tension; the explanation must be found in the clinically and anatomically proved existence of a retinal affection peculiar to the glaucomatous eye, which exhibits itself, like the glaucomatous affection of the blood-vessels of the iris, by degeneration of their walls and temporary spasms of their muscles. The glaucomatous affection of the retina, like the glaucomatous affection of the iris and optic nerve, is not present in each case of glaucoma, nor during all stages of the affection. Brailey's researches prove that it is frequently completely wanting.

---

[1] By pressure upon the artery previous to its entrance.—Ed.

[2] Often met with in ret. Bright.—Ed.

The connection between glaucomatous affections of the iris and retina is usually developed in such a way that both parts of the glaucomatous process appear simultaneously, and co-exist afterwards either for only a short period, in a manner distinctly recognizable, as in the so-called premonitory stage, or permanently, in the so-called inflammatory glaucoma, in both its chronic and acute form. At times, however, the glaucomatous affection of the retina precedes that of the iris, existing for weeks and months without any recognizable deviation from the normal condition of the anterior section of the eye. As increased tension is only a symptom of the glaucomatous affection of the iris, every trace of a pathological increase of pressure will be found wanting whenever a glaucomatous retinal or optic-nerve affection occurs alone.

As to the connection between the degeneration of the walls of the blood-vessels and the spasms of the latter, which unite in producing glaucomatous affection of the retina, I believe I am justified in assuming the affection of the vaso-motor nerves to be the primary condition and that it produces degeneration of the walls. It has been already mentioned that the spasm of the retinal blood-vessels seems to explain the premonitory visual disturbance and the possibility of preventing the return of the same, as well as the formation of lasting glaucomatous changes by a speedy iridectomy. Glaucomatous disturbance of sight is not dependent on increased tension, and the operative removal of the same cannot therefore be the cause of the restoration and preservation of sight by iridectomy. This operation seems to remove, in a manner thus far not entirely understood, the pathological condition of excitation of the vasomotor nerves of the retinal blood-vessels, and a stop is thus put to the progress of degeneration of their walls.

As regards the glaucomatous optic-nerve ring we must await further explanations, in order to ascertain whether the glaucomatous process causes, at times, changes in the blood-vessels of the choroid, similar to those found by Ulrich in the blood-vessels of the iris, and by Brailey in those of the retina. Investigations of the sclerotic, in this respect are also wanting; but discoloration of the sclerotic, its peculiar rigidity, the fatty degeneration of the connective-tissue cells (observed principally by Coccius), the thinning and formation of ectasias which occur in some parts of the sclera in the late stages of the glaucomatous process, render it very probable that the nutrition of the sclerotic is interfered with by a peculiar affection of its vessels.

No unanimity has yet been reached touching the cause or starting-point of glaucomatous inflammation, nor of its mode of spreading and characteristics. This is certainly sufficient to ratify "the general concurrence of opinion" established by Graefe, the disturbance of which by v. Jaeger and his pupils is so deeply regretted by Jacobson. In no part of ophthalmology are slight knowledge and great positiveness so closely allied as in the teachings concerning glaucoma. Jacobson errs in stating that a new understanding is requisite as to what should be termed glaucoma; for the diagnosis of this affection does not depend upon the glaucoma theory of the diagnosticians, and followers of very different theories agree in terming identical cases glaucoma. Unlimited confusion, however, reigns in the theoretical teachings concerning glaucoma, owing to the vaunted pressure theory, which forms an arena for a doubtful hypothesis, and of auxiliary hypotheses, themselves sorely in need of assistance.

In order to establish a basis for a glaucoma theory, we must entirely set aside the existence of a pressure hypothesis, and subject each symptom occurring in glaucoma to a fresh, thorough, unprejudiced investigation. It will then be discovered that at present we possess only one work, free from all theoretical prejudice, which treats of the occurrence and course of glaucoma—a work not explaining, but describing glaucoma in a masterly way, and which is therefore destined to form the basis of a glaucoma theory. This work was published by my lamented teacher, Edward von Jaeger, in the year 1858. According to this author, glaucoma symptoms may be classed under two well-defined groups. The one embraces the glaucoma symptoms known of old, and is formed within the field supplied with nourishment by the blood-vessels of the choroid ; the other is visible only with the ophthalmoscope, and is seated in that part supplied by the blood-vessels of the sclera—glaucomatous affection of the optic nerve or sclerotic. The latter disease sometimes precedes that of the choroid, at other times it follows it, or both are simultaneously developed. If, however, one group of symptoms is developed to a certain degree, then the other group is also always developed ; and this regular steady development of the process in all parts supplying nourishment to the eye, for the central blood-vessels also become affected, although in a lesser degree, is a most remarkable peculiarity distinguishing the glaucomatous process from all others occurring in the eye.

The point from which the disease starts is not to be found in any special part of the eye, for the whole course seems to indicate that the disturbance arises from a *starting-point common to different parts supplying nutrition, and must therefore be more remote.* The slightness of the material changes in the glaucomatous eye is remarkable, the disturbances are mostly functional, and there appears to be great difficulty, if not an impossibility, of spontaneous reparation. The nature of the process is entirely unknown, but it belongs undoubtedly to regressive metamorphosis. The process probably makes its appearance not only in the eye but also in other organs, and without creating a precedent, but merely to acknowledge the peculiarity of the process, the term *gout* might be adopted for a while. As v. Jaeger does not know the nature of glaucoma, he cannot explain its symptoms ; he is, however, of the opinion that the excavation in glaucomatous affection of the optic nerve has been very erroneously distinguished from amaurosis with excavation of the optic nerve, and is due to local decrease in the power of resistance by the glaucomatous process, but not to the increased intra-ocular pressure. The development of the peculiar glaucomatous process is sometimes attended with inflammatory symptoms, which, however, are not essential, as it is developed even to the fullest extent without those symptoms ; they only represent the form in which glaucoma may appear. It has for a long time been agreed upon that discoloration of the sclerotic, enlargement of the anterior ciliary blood-vessels, mydriasis, atrophy of the iris, and impairment of vision may be developed to a high degree in the glaucomatous eye without signs of inflammation. According to von Jaeger, then, these symptoms are glaucomatous.

I must now proceed to mention the very remarkable statement made by v. Graefe in his preliminary notice on the nature of glaucoma. In that notice he declared that the change noticeable at the entrance of the optic nerve (which at that time was looked upon as an elevation) was a consequence of diseased circulation in the central artery, and that the manifold other changes in the eye were caused by the anomalous and limited circulation in the ciliary blood-vessels. The summing up of the changes to be observed in the choroid as well as in the iris consists in atrophy of the tissue, obliteration of part of the arteries, enlargement of some venous trunks, maceration of the pigment, occasional œdematous infiltration, and hemorrhages. All these changes, which are not characteristic of inflammation, can well be referred to disturbances in nutrition, caused by diseased blood-vessels.

After all that has been said on different sides, glaucoma is, according to our theory, an affection of the ocular blood-vessels, developed either successively or simultaneously in the areas through which the blood-vessels of the long posterior and the anterior ciliary arteries extend, and probably in the area supplied by the posterior ciliary arteries. The affection of the blood-vessels consists in spasms of the arteries and degeneration of their walls, and according to the share which the two components of the vascular disease have in certain cases, the glaucomatous disease manifests itself in an acute, subacute, or chronic form. The fact that the glaucomatous process is a systemic and not an organic affection of the eye, explains why no membrane of the eye, and no part of the kernel of the globe, remains healthy. Glaucoma, therefore, represents only a general ocular affection, and holds no place in a system of affections of the eye based upon the anatomical sequence of the diseased parts, and must be treated in connection with each part. The localizations of the glaucomatous process are best known in the iris, retina, and optic-nerve. The structure and function of each of those organs differ; consequently, also, the glaucomatous changes recognizable during life. The circulation in the blood-vessels of the attacked organs is disturbed, their tissue exhibits progressive atrophy, their functions steadily decay. If disturbance in the circulation of the retina is principally caused by steady progressive degeneration of the walls of the blood-vessels, then the loss of functional power ensues gradually. If it is caused by sudden spasms of the blood-vessels, the retinal function is suddenly lowered, and rises to its former standard according to intensity and duration of the spasm, or remains lastingly diminished or entirely destroyed. And here I may be permitted to state that the results of one hundred and thirty-six examinations of the field of vision of seventy-seven glaucomatous eyes in fifty-nine individuals, tended to prove that most ophthalmologists are mistaken in supposing that the field of vision is principally contracted on the nasal side. Examinations show it to be contracted pretty evenly on all sides, so much, in fact, that the term "concentrically narrowed" may be deservedly applied. There is, therefore, no explanation required why the field of vision is generally limited on the nasal side. The fact to be explained, and the explanation of which has been attempted in different ways, does not exist. The average visual field obtained by me from one hundred and thirty-six and one hundred and twenty-six examinations respectively, is 19.8° and 21.9° respectively on the nasal, and 19.1° and 22.6° respectively on the temporal side, smaller than the normal. If, notwithstanding this surprising equality of the loss of the field of vision at both ends of its horizontal diameter, an opinion could be arrived at that the narrowing takes place principally from the nasal side, and, moreover, that this form of narrowing is characteristic of glaucomatous disturbance, then it might very probably be traced to the fact that the healthy and not the diseased parts of the visual field were compared, and that the position of the limit of the visual field relatively to the centre, changed by the disease, had been principally taken into consideration, and sufficient weight had not been laid on the fact that the distance of the lateral limit from the centre of the normal field is nearly twice as great as the distance from the medial.

In the glaucomatous affection of the optic nerve, the disturbance during life in the circulation is characterized first by dull redness, later on by a paling of the papilla; atrophy is recognizable in the formation of the excavation, and visual disturbance (which thus far cannot with any certainty be separated from that caused by the retinal affection) by development of the glaucomatous optic-nerve ring. Each part of the glaucomatous affection makes its appearance either in an acute or chronic form, and the natural division may therefore be considered as *acute* and *chronic* glaucomatous affection of the *iris*, *retina*, and *optic nerve*.

PROLAPSE OF THE RETINA INTO THE ANTERIOR CHAMBER OF THE EYE FOLLOWING DISLOCATION OF THE LENS INTO THE POSTERIOR CHAMBER.

By Dr. E. BERGER,

PRIVATDOCENT AT THE UNIVERSITY IN GRATZ.

(*With figs.* 1 *and* 2 *in plate v. of vol. xv.*)

Translated by Dr. J. E. Weeks.

IT is well-known, that, in perforating injuries to the fibrous coat of the eye and in large perforating ulcers of the cornea, when the lens and a portion of the vitreous escape, the retina may be found lying in the wound. In the literature on dislocation of the lens into the posterior chamber of the eye, I fail to find mention made of a case where, without injury to the sclerotic or cornea, the retina has appeared in the anterior chamber. For this reason I feel justified in reporting the following case, which also possesses other points of interest.

Josefa S., æt. thirty-five years, seamstress, is slightly anæmic. Was well up to March, 1884, when she experienced rheumatic pains in the left shoulder which persisted for some months. For nineteen years the patient has suffered from the results of a blow from a barn fork on the left eye. After receiving this injury she was insensible for some hours and had to be carried into the house. Great ecchymosis of the lids occurred, and it was some days before the eye could be seen. Some time after she received the injury, the patient, on looking into the mirror, noticed a white body lying in the pupil. During the last six years, this white

COLLEGE LIBRARY

Fig. 1.

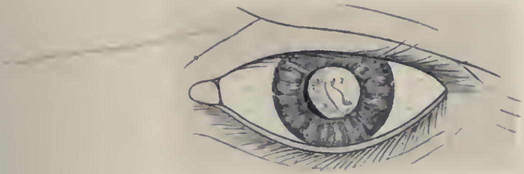


Fig. 2.

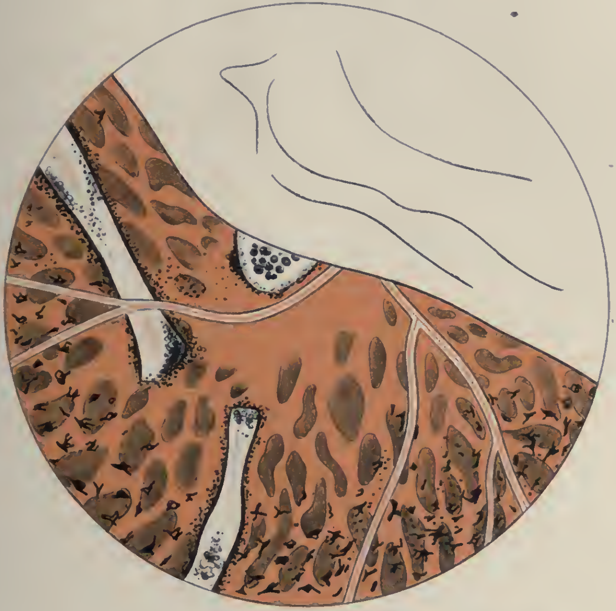
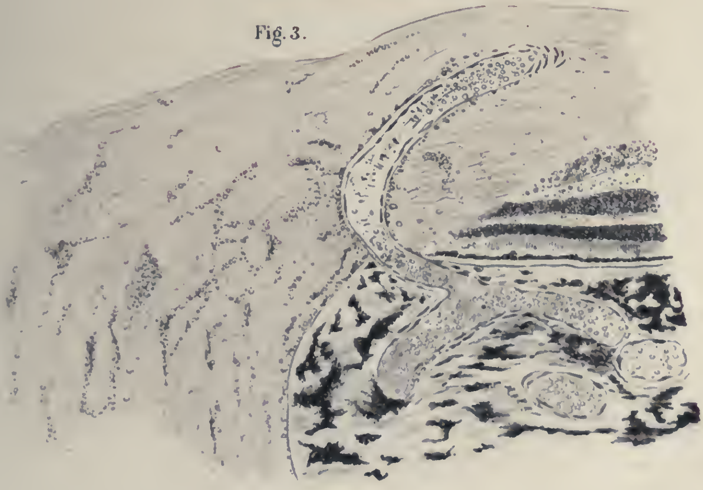


Fig. 3.



Lith. Anst. v C Kirst, Leipzig

body has been very prominent. The patient has had only perception of light in the injured eye, ever since the injury occurred. A slight degree of divergent squint exists in the left eye.

The conjunctiva, cornea, and iris, are normal. The pupil is wide and reacts readily to light. A white, opaque, folded membrane occupies the pupillary space, (see fig. 1). On movement of the eye, or sudden turning of the head, *both* membrane and iris are thrown into tremulous motion.

A very small portion of the pupil, at the lower and inner part, is free and appears black. Oblique illumination shows that the folded membrane, which, by the ophthalmoscope, is seen to be detached retina, bulges into the anterior chamber. This bulging is most noticeable in a long slanting fold traversing the centre of the pupil, and in the upper outer portion of the membrane, which likewise reaches into the anterior chamber. The iris does not lie in an even plane but is pressed forward above. The lower portion of the membrane, which can be seen in the pupillary space, lies far back of the plane of the iris; its details can only be determined with the ophthalmoscope.

If the patient bends her head forward, the membrane comes farther into the anterior chamber; this is particularly appreciable in the long fold alluded to above. This position also causes the iris to fall forward, its slanting position becoming much more marked.

By retaining the dorso-recumbent position for some time, the retina is made to leave the anterior chamber of the eye almost entirely. If the pupil is dilated with atropine the temporal part of the retina becomes more prominent. If eserine is used, the retina recedes from the anterior chamber to a certain extent, but the remaining portion, especially that to the upper outer side, is more prominent. Changes in the position and form of the bulging retina are produced when the patient lies on either side. No vessels can be seen on the detached and bulging retina.

By ophthalmoscopic examination, after the pupil has been dilated with atropine, the retina is seen to be detached in all parts except in the inner lower quadrant. The disc is covered by the floating retina. The optic media are clear.

In that portion of the fundus where the retina still remains attached, the refraction of the eye is hypermetropic 5 D. The accompanying cut (see fig. 2) represents the appearance of the fundus in the upright image. A tendinous stripe, bordered by a broad band of pigment, appears in the upper part of the fundus; it extends, slightly curved, toward the temporal side. In some places the pigmented border is irregular. Above it is almost entirely wanting, and the outlines of the stripe are less distinctly marked. The change above described, lying as it does in the choroid, is probably a cicatrix resulting from a rupture of the choroid. A second cicatrix, resulting from rupture of the choroid, appears below and to the nasal side; this one has a meridional direction (recognized as a very uncommon course for rupture of the choroid), and divides into two branches as it approaches the periphery, one branch becoming more equatorial in direction. A tendinous patch (near the middle of the cut), partly bordered by pigment and covered with numerous irregular pigment spots, can be seen near the border of the detached retina, evidently indicating the position of a third rupture of the choroid.

The central vessels of the retina are very small, however, at the posterior pole, their double contour can still be distinguished. Their walls are much thickened, and appear as white lines inclosing a thin blood stream. The retinal vessels pass over the ruptures in the choroid.

The undetached portion of the retina, at the equator, is covered with numerous, irregular patches of pigment. Some of these patches resemble bone corpuscles in shape, and are distributed throughout the nerve-fibre layer of the retina, accompanying the retinal vessels; others are found in the deeper layers of the retina. These patches of pigment also extend over the ruptures in the choroid in many places. This peculiar form of pigmentation includes only the sector of a zone at the equator of the eye, the peripherical portion of the retina remaining free from pigment.

Numerous small, glistening, yellowish-white spots can be seen at the periphery of the fundus, arranged singly or in groups; some of these spots are surrounded by a dark zone. A few similar spots are found in the fundus, near the posterior pole. These bodies lie in the posterior layers of the retina, and are undoubtedly hyaline excrescences of the choroid. In the parts of the choroid that can be examined with the ophthalmoscope, the pigment epithelium is atrophic. The intervascular spaces appear enlarged and deeply pigmented.

In examining the periphery of the fundus below, a well-defined, circular object is noticeable, which is easily recognized as the cataractous lens. Only a small portion of this body is visible. On the temporal side the lens is covered by the detached retina. Functional examination shows that vision is reduced to perception of light, in the detached portion of the retina.

If a lamp be held in the lower part of the field, the light from it can be distinguished; if held in the upper and outer portion of the field (corresponding to the attached portion of the retina), no light is perceived.

The tension of the globe is slightly below normal.

Diagnosis.—Dislocation of the lens into the posterior chamber; partial detachment of the retina, with bulging into the anterior chamber; numerous ruptures of the choroid; atrophy of the choroid; typical retinitis pigmentosa in the undetached portion of the retina.

It is apparent that no benefit could be obtained by treatment in this case.

The right eye is normal, and is emmetropic. $V = \frac{20}{20}$.

Because of the bulging of the retina into the anterior chamber (a condition not before described), the foregoing case appears to me to be worthy of notice. The apparent increase in the size of the prolapse where the head is bent forward and when the pupil is dilated (perhaps the increase is illusory), the return of the retina to the posterior chamber when the patient assumes the dorso-recumbent position, and a diminution in the size of the bulging portion when the pupil is small, are phenomena which resemble those observed in the, so-called, spontaneous mobility of the lens. (Heymann.)

The partial pressing forward of the iris by a portion of the retina, and the change in the form of the prolapsed retina when the patient lies on his side are also interesting phenomena.

The conditions for the change in the position of the retina in this case appears to have been particularly favorable. In this, as in the majority of cases of dislocation of the lens into the posterior chamber, the vitreous became liquefied and the extensive detachment coupled with the slight difference in specific gravity between the retina and liquid vitreous made the change in position possible. In cases of dislocation of the lens, with accompanying detachment of the retina, prolapse of this membrane does not appear to have been noticed, for the reason, I believe, that it cannot occur without some further complication.

A rough measurement with a piece of thread of the temporal side of the retina, in a horizontal section of an eye, would indicate that a simple total detachment of the retina is not sufficient to permit it to enter the anterior chamber. It is necessary that the retina should become detached either from the disc or from the ora serata before it can enter the anterior chamber and lie there in folds. Probably partial detachment from both disc and ora serata had taken place in this case.

The fibres from the optic nerve that are distributed to the upper and outer portion of the retina were undoubtedly intact. This would account for the preservation of perception of light in the detached portion of the retina. A rupture of the retina, near the disc, extending meridionally, might occur without destroying these fibres.

It is a well-known fact that the detached retina may retain quantitative perception of light for years. The condition of partial retinitis pigmentosa is a peculiar feature in this case—a condition that has never before been described. That the change is confined to one side,[1] is a fact of no moment, as the pigmentation is plainly secondary.

The complete destruction of the function of that portion of the retina that remains attached cannot have been produced by rupture of the choroid alone; possibly it was brought about by the occurrence of a chronic choroiditis or partial atrophy of the optic nerve as a result of the ruptures. The loss of vision in the attached portion of the retina may have been caused by the presence of the lens in the posterior chamber, which produced a secondary glaucoma or a choroiditis. Retinitis pigmentosa as a result of glaucoma or choroiditis is of quite frequent occurrence (Leber in Gräfe-Sæmisch's *Handbuch*, Bd. v., p. 634). This also explains the atrophy of the choroid above mentioned.

---

[1] The simple form of retinitis pigmentosa, also retinitis pigmentosa due to syphilis, confined to one eye, has been observed (Baumeister, Pedraglia).

Berlin (*Klin. Monatsbl.*, 1871, vol. ix., p. 278) has noticed, after section of the optic nerve, development of pigment in the retina originating in the pigment epithelium. This appears to explain the complete absence of pigment in the detached portion of the retina, as the pigment epithelium generally remains with the choroid, or, when detached with the retina, degenerates in a very short time.

Why only the detached portion retains perception of light remains unexplained.

THE CILIO-RETINAL BLOOD-VESSELS.

By Dr. A. BIRNBACHER, Graz.

(FROM THE PATHOLOGICO-ANATOMICAL INSTITUTE, GRAZ UNIVERSITY.)

Translated by Dr. J. E. WEEKS, New York.

(*With fig.* 3 *of plate v. of vol. xv.*)

H. MÜLLER[1] and Nettleship[2] have found and described blood-vessels ramifying in the inner layer of the retina, which were not branches of the central vessels of the retina. Neither of these authors, however, could demonstrate the origin of these vessels, and the researches of Schnabel and Sachs[3] made it appear doubtful whether retinal branches were given off from the ciliary vessels.

The value of Nettleship's case is somewhat impaired by the fact that his sections were made from an eye in which papillitis had taken place, making it possible that the vessels described were newly formed and were the result of inflammatory action.

Fortunately, I am now prepared to demonstrate a specimen in which the existence of the so-called cilio-retinal vessels is proved beyond a doubt.

The specimen is from a perfectly healthy eye, and was obtained by horizontal section.

From a vessel 52 μ in diameter, lying in the choroid near the optic foramen, which, from the amount of muscular and elastic tissue that its walls contain, I judge to be an artery, a branch is given off. After passing toward the papilla for a short distance, this branch bends over the border of the choroid, enters the superficial portion of the nerve-fibre layer of the retina, and runs toward the macula. Its medium diameter is 40 μ.

The fact that arterial branches which originate from the ciliary vascular system ramify in the nerve-fibre layer of the retina and supply nourishment to portions of the layer, is demonstrated by this specimen.

As the diameter of the arteria centralis retinæ is 120 μ., the cilio-retinal vessels, in this case, correspond to its branches of the second class. They are, of course, plainly visible with the ophthalmoscope.

The statement of Schnabel and Sachs that, considering the development of the eye, the existence of cilio-retinal vessels is in the highest degree improbable, I consider refuted. In proof of their existence I may mention the researches of Leber,[4] who has described small communicating arterial branches between the choroidal and retinal vessels where the retina encircles the papilla, the existence of which is admitted by Schnabel and Sachs.

It appears rational to believe that, if in the normal eye small vessels are developed in exceptional cases, larger ones may be found without in any way affecting the development of the eye or being in the highest degree improbable. Further, as references to fig. 3 will show, it is not necessary that the lamina vitrea should be pierced in order to permit of vascular communication between the vessels of the choroid and those of the retina. They may easily pass over the border of the lamina vitrea from choroid to retina.

Some time ago I had an opportunity to observe and describe a case where cilio-retinal vessels were present, in which embolism of the arteria centralis retinæ occurred.[5] The calibre of the cilio-retinal vessels remained the same after as before plugging of the central artery of the retinæ. They came from the temporal side of the papilla, and were undoubtedly branches from the ciliary vessels.

Schnabel and Sachs do not agree with me in regard to this case. They hold that after sudden closure of the lumen of the arteria centralis retinæ, hyperæmia of the ciliary vascular system occurs, and that on account of the ischæmia of the retinal vessels we may expect an over-filling of the small communicating cilio-retinal vessels. Closure of the arteria centralis retinæ certainly produces hyperæmia of the vascular system of the choroid; but, when we consider the calibre and origin of the branches of the ophthalmic artery and the direction of the blood stream, we must admit that the degree of hyperæmia will be very low. The over-filling, which results from embolism of the arteria centralis retinæ, distributes itself throughout all the branches of the ophthalmic artery; hence, the choroidal vascular system can be but little affected. The combined diameters of the vessels of the uveal tract is relatively so great that it would be impossible with the ophthalmoscope to determine a change in the calibre of small branches of this system, produced by a slight increase in the amount of blood passing through the ciliary arteries. If these blood-vessels, however, are not cilio-retinal, but branches of the arteria centralis retinæ, given off behind the location of the embolus, the over-filling of these vessels would be much more marked, and the chances for determining an increase in their calibre with the ophthalmoscope much more favorable. The blood supply, which before was distributed throughout a large number of relatively large branches of the central artery, has, in this case, but two or three small branches to pass through. I must, therefore, hold my opinion, as stated above, to be correct, Schnabel and Sachs to the contrary, notwithstanding.

It is far from my intention to attempt to prove that all vessels which, with the ophthalmoscope, are seen to enter the retina at or near the border of the disc, originate from the ciliary vessels; only those can be known to be cilio-retinal which are not affected by embolism of the arteria centralis retinæ.

The cilio-retinal vessels are, as a rule, distributed in the portion of the retina lying between the papilla and the macula lutea, and thus preserve a very valuable amount of vision when embolism of the arteria centralis retinæ occurs.

---

[1] *Arch. f. Ophthal.*, vol. iv., part 2, p. 8.

[2] *Ophthal. Hosp. Rep.*, vol. ix., part 2, p. 162.

[3] These ARCHIVES, vol. xv., p.

[4] Graefe-Saemisch's *Handbuch*, vol. ii., p. 307; vol. v., part 2, p. 547.

[5] *Centralbl. f. prakt. Augenheilk.*, July-August, 1883.

NOTE OF A CASE OF INTRAOCULAR HEMORRHAGE CAUSED BY A FALL ON THE OCCIPUT.

By A. SCHAPRINGER, M.D., New York.

On October 24, 1886, I was called to see Mrs. K., a patient of Dr. Edward J. Messemer, in order to examine her eyes. She was thirty-seven years old, of feeble build, and was the mother of thirteen children. The day before, while engaged in some household work, she had a fainting fit and fell backward, her occiput striking the floor with a loud thud. During the efforts made by frightened members of her family to revive her a quantity of spirits of hartshorn was spilled over her face. When I saw her the next day, her face bore the evidence of this mishap. The lids of both eyes were swollen and tender, and the conjunctivæ hyperæmic. The right eye was otherwise normal, both as to function and appearance. The left eye, besides an intensely congested ocular conjunctiva, showed the following abnormal appearances: While the cornea was perfectly clear, the aqueous humor was somewhat hazy. The pupil was dilated, oblong, the larger diameter being in the vertical direction, slightly irregular, and immovable. A small amount of blood was seen at the bottom of the anterior chamber. No lesion or continuity could be made out anywhere in the iris. With the aid of the ophthalmoscope and a tallow-candle, the only means of illumination at command, a uniformly red reflex could be obtained from all parts of the fundus, but no details could be made out. The patient could count fingers with this eye only to a distance of five or six feet. The motility of the globe was not impaired. The lens was perfectly normal in every respect.

The woman was soon afterward transferred to a hospital, and I have had no further chance to see her.

The only explanation for the hemorrhage, which had taken place in the left eyeball of this patient, can be found in the severe concussion of the skull which she had suffered, to which cause the paralysis of the sphincter pupillæ muscle has to be ascribed also. I could not make out the exact location of the ruptured blood-vessel, but as the amount of extravasated blood was very small, the vessel must have been a very minute one, for which reason its location could never have been determined.

As far as I have examined the literature of this subject I have not found the record of a single case of a similar nature. It seems possible that cases of intraocular hemorrhage from concussion of the skull escape notice on account of the severe brain symptoms which are usually present, and which fully occupy the attention of the physician. If the hemorrhage be slight, as it was in the case here recorded, it is apt to disappear in a very short time without leaving a trace.

A NEW INSTRUMENT FOR PERFORMING OPTICO-CILIARY NEUROTOMY.

By WM. ELLERY BRIGGS, Sacramento, Cal.

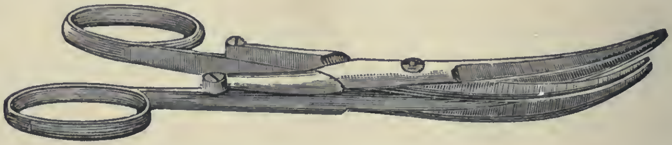
SINCE 1879, when Schoeler first advocated section of the optic and ciliary nerves as a substitute for enucleation, many and conflicting opinions have been expressed as to the value of the operation and the permanency of its results. Its place in ophthalmic surgery is still unsettled. It has been abandoned by some authorities as unworthy of further trial, while others as eminent continue to express their conviction of its utility in properly selected cases.

The gravest objection that has been urged against the operation is reunion of the divided nerves and, consequently, re-establishment of those conditions for which it had been undertaken. To obviate this, some surgeons cut the internal rectus, or, following the practice of Meyer, divide the internal and external recti and both obliqui, which permits the eye being rotated sufficiently that a section of the nerves from four to six millimetres in length can be removed.

The fact that extensive operative procedure still further impairs the nutrition of the diseased organ, and the strabismus left after dividing the rectus muscle increases the deformity, first led me to devise an instrument by which the results of Meyer's operation could be attained without its disadvantages.

The apparatus, which was briefly noticed in my report on ophthalmology to the State Society (Trans. Med. Soc.

State of Cal., 1881 and 1882, page 150), was made by Messrs. Shepard and Dudley, of New York. It consists of two pair of curved scissors, united in such a manner that their cutting edges are from three to four millimetres apart, while their points are closely approximated. When closed in operating, the divided section of the nerves is pressed between the blades and withdrawn with them. The scissors work so that the two sections are made simultaneously. The steps of the operation are very simple. Under the influence of an anæsthetic (either general or local), I divide the conjunctiva and subconjunctival tissue, and introduce the instrument, with the blades closed, between the internal and inferior recti muscles. The optic nerve will be found, and the remainder of the operation performed, precisely in the same manner as it is divided in the process of enucleation.



I have now used it in three cases, and in two which I have been able to trace there has so far been no recurrence of pain. I shall be glad to give any correspondent other details or information in regard to the instrument.

IS THE POSITION OF REST THE CAUSE OF STRABISMUS?

By Dr. EDWIN J. GARDINER, of Chicago, Ill.

IN Vol. XV., No. 3 of these ARCHIVES Prof. J. Stilling, of Strasburg, published an article entitled "On the Origin of Strabismus," in which he asserts, that "the cause of squint is not hypermetropia, but the position of rest usually associated with hypermetropia, viz., convergence." Not believing this assertion to be correct, and being convinced that the discussion of these important questions is one of the avenues by which truth is reached, I propose to state as concisely as possible my reasons for differing with the author of the article.

In order to discuss the matter intelligently it is necessary first to state the conclusions which led to the formation of the theory, and then proceed to discuss the theory itself. To the experiments which led to his conclusions Dr. Stilling has evidently given abundant time and much thought, and he is certainly well repaid for his trouble, for this part of the article is pregnant with information of a most interesting and valuable nature. He started out to ascertain the direction which the visual axes assume when the eyes are at rest; and from this starting-point he has travelled over the whole field, making every anomaly of refraction and of muscular dynamics yield its quota to the interesting display of information presented in the article. These are the author's conclusions:

1st. "In the position of rest most eyes are convergent, many divergent, a few only are parallel."

2d. "In each form of refraction every variety of the position of rest may occur. In a great majority of cases of hypermetropia the position of rest is convergence, whilst in myopia it is divergence."

The author next considers the relations of the position of rest to adduction and abduction. Having ascertained by experiment how much the distal adduction and abduction in normal eyes amounts to, he cites several very interesting cases which illustrate his third conclusion, viz.:

3d. "The relations of the values of abduction and adduction to the position of rest of ametropic eyes are by no means constant."

It is then stated that, "Among the factors to be taken into consideration as influential in determining the position of rest (besides refraction and the muscular condition), and which have not yet been made the object of study, are the shape of the orbital cavity, the topographical relations of the fibrous structures and the other soft parts surrounding the globe, the position of entrance of the optic nerve, and perhaps the angle α. In emmetropia as well as in hyperopia these factors probably favor convergence as a position of rest, whilst in myopia the opposite is likely to prove to be the case." Using these conclusions as a basis Dr. Stilling proceeds to explain the production of squint. He says: "Normal vision is a continual struggle of the ocular muscles for binocular fixation against natural obstacles. If for one reason or another one eye becomes unable to keep up this struggle, or if it becomes impossible for both eyes to continue it in unison, then either one eyeball or both alternately will pass into the natural position of rest. Abolition of binocular vision may be due to many causes, and may originate either in the muscles or in the eyeball itself. In the majority of cases they originate in the eyeball itself, and are well known to us. I allude to differences of refraction and to the different varieties of amblyopia."

With regard to the squint found associated with amblyopia acquisita (in adults), it would be well to bear in mind that it is usually of the divergent form, and in these cases I believe that the refraction (with the exception perhaps of a few cases of hypermetropia) plays but a secondary rôle, and that the divergent squint is the result of the operation of a general biological law, which predicates that when an organ is not used its functions are gradually lost. If one eye has become blind from one cause or another, the struggle for binocular vision ceases. When the good eye is directed to an object where convergence is necessary, the blind eye simultaneously converges, by force of habit, and in obedience to identical nerve stimulation ; but as the object is not seen, the convergence of this eye becomes unnecessary, and gradually it becomes unsteady, then lags behind, and passes into a relative divergent strabismus, which may or may not become absolute. Of course if there existed a degree of hypermetropia which calls on an extra degree of convergence to increase the accommodation, the eye will turn in, for such a condition of things is the most favorable to the production of strabismus convergens—but we are here dealing with amblyopia acquisita regardless of the refractive condition, and these cases are certainly not corroborative of Dr. Stilling's conclusion No. 1, for in this case the most common variety of squint would be the convergent form, and experience I believe teaches that the opposite is the general rule.

The author then proceeds to explain the production of squint in hypermetropic eyes, in which one eye is affected with congenital amblyopia, or in which the difference of refraction is so great that one eye is incapable of binocular fixation. Then "The laws of relative accommodation will become inoperative, and the eyeball instead of assuming a convergent position will pass into its individual position of rest. If this position is a marked convergence, convergent strabismus will ensue. If it be slight convergence only, the consequence will be relative divergent strabismus, either permanently or only temporarily, changing later on into absolute convergent squint by reason of secondary atrophy of the relaxed external rectus and contracture of the internal muscle. . . . In such cases the matter is clear and simple."

That the condition of things mentioned in this paragraph, viz., hypermetropia combined with an amblyopic eye, or an eye so hypermetropic that distinct vision with it is not attainable, is most favorable for the production of convergent squint, is very clear, but the process by which the author claims it is produced is not at all clear to my mind. In fact, it seems to the writer that a very important fact is overlooked in this paragraph, viz., that in hypermetropic eyes, even when one is amblyopic or so hypermetropic that with the highest tension of accommodation distinct retinal images are not possible, and consequently the laws of relative accommodation become inoperative, the relation of accommodation to convergence is not abolished. The laws of relative accommodation simply deal with the fact that, with a given convergence of the visual axis, the accommodation may be increased or relaxed, but these laws recognize as their fundamental basis the constant interdependence of accommodation and convergence. The manner in which convergent squint is produced, under such favorable circumstances, is too well known to need an exposition in this place, and, besides, Prof. Stilling adopts the same explanation up to the point where the eye turns in to excess, then, it is claimed, the eye assumes its position of rest; and here the author deviates from the generally accepted theory, which holds that the one eye, by excessive convergence, *actively* aids the other to attain and to maintain a tension of accommodation much higher than what its angle of convergence would warrant. To prove this statement, it will suffice to cover one eye of a hypermetrope of 2 or 3 D. While he fixes a distant object, the covered eye will deviate inward, not indeed because it assumes its position of rest, but because the accommodation operating to the extent of 2 or 3 D calls for a convergence of 2 or 3 AM. This deviation did not take place before one eye was covered, because of the inherent desire for binocular fixation, and a consequent shifting of the relative range of convergence; but when binocular vision is rendered impossible by excluding one eye, the convergence will immediately balance with the accommodation. If the object is brought toward the "near point," the covered eye will exhibit a relative increase of convergence, and very frequently it will assume an unnecessarily strong convergence, in order to facilitate still more the accommodation of the other eye. That the "position of rest" is not the cause of these phenomena, is obvious from the fact that emmetropic and even myopic eyes (of moderate degree), whose visual axes are parallel or slightly divergent, if rendered artificially hypermetropic with concave glasses, and experimented upon in the above-mentioned manner, will exhibit, as a rule, the same phenomena.

The production of strabismus, where both eyes are evenly or only moderately hypermetropic, is finally taken up. In this, as in the former case, the well-known theory of Donders is used to account for the phenomena up to the point, where the hyperope, by sacrificing binocular vision, emancipates himself from the laws of relative accommodation. And, says Dr. Stilling, "therefore one of the eyes or both alternately pass into a position of repose. By sacrificing binocular vision the hypermetrope emancipates himself from the laws of relative accommodation, the positive part of which has become too small, his absolute accommodation becomes free for monocular vision, and asthenopia disappears partly or entirely."

The same line of argument is applicable to this explanation. The pertinent question is whether, after the eye has deviated, it has assumed its position of rest. I believe not, and for these reasons: If the absolute near point is found for an eye, either hypermetropic or emmetropic, by placing an object in the median line while the other eye is covered, we will find, on inspection of the excluded eye, that it is squinting inward, thus assisting the uncovered eye in its accommodation by excessive convergence, not by assuming its position of rest; for, were this the case in eyes whose position of rest is parallelism, this condition of things would not take place, and it can be proved by experiment that it does. In a case of convergent strabismus—notoriously in the periodic stage, but also when the strabismus has become constant—the approximation of the fixed object produces an increased deviation of the squinting eye. Now, if the squint is produced by the eyes assuming a position of repose, we will have to admit a number of degrees of repose, and inasmuch as the deviation increases, as the accommodation and convergence of the other eye are brought more into play, we will be obliged to infer that the deviating eye rested the harder the more the other eye had to work. But the question may be asked: Why, if this be not the position of rest, should the patient seek it? Prof. Donders has answered this question most satisfactorily. In the first place, by turning the eye inward, the unpleasant double images are disposed of, and this extra convergence is a help to the other eye in its accommodation. The relative accommodation is done away with, but the correlation between accommodation and convergence is not abolished by strabismus. Again, it is quite notorious that in some cases of established strabismus convergens, even where one eye has become quite amblyopic, the continued use of atropine and of properly fitted glasses will produce a marked amelioration in the condition, and at times bring the eyes to their normal position. Now, if the eye is in a position of repose, what inducement would there be for it to return to its normal position? But, on the other hand, if we remember the interdependence of convergence and accommodation, we readily understand why paralyzing the accommodation, rendering distant vision possible by suitable glasses, we have removed the *cause* of the squint, and therefore (if the shortening of the internus has not become organic) nature, relieved of her burden, once more struggles for that which is normal. The relation between cause and effect in all these cases is so clear, that all room for doubt, or for other than this theory, is excluded; and therefore I cannot admit with Prof. Stilling that "the cause of squint is not hypermetropia, but the position of rest usually associated with hypermetropia, viz., convergence."

The constant association claimed for the convergent position of rest with hypermetropia, would naturally lead us to infer that the convergence is caused by the hypermetropic formation of the eyeball; and on this account the position of rest should certainly be taken into consideration, not as the cause of strabismus, but as one of the circumstances which co-operate in the production of convergent squint in hypermetropic eyes. More investigations are necessary, however, before this association can be set down as a constant thing. Personally, I have not yet been able to prove it, but my experiments are not sufficient to bear evidence in one way or the other.

Among the circumstances which co-operate to produce strabismus convergens in hypermetropia there is one which the author dismisses too soon. I refer to the angle α. Prof. Donders attaches considerable importance to the magnitude of this angle in the production of strabismus, and, although it has recently been judged as a rather doubtful element by Landolt, I believe that the facts show that the eminent physiologist is right in his assertion. Landolt's objection is that the size of this angle is not in sufficiently constant relation with the degree of strabismus. Donders claims that with equal degrees of H, high values of the angle a especially predispose to strabismus convergens. And although the differences shown by Donders' two tables are very small, they are constant.

In the discussion of the vexed question, why all hypermetropes do not squint, Dr. Stilling ingeniously weaves in his theory of the position of rest. And here he obtains an advantage which before he could not enjoy, because his theory has no strong enemy in the field to overcome. We know why some hypermetropes squint, but we do not know why certain hypermetropes do *not* squint. That this question is very unsettled in the minds of ophthalmologists is obvious from the great number of theories which are found in the text-books on this subject. And the truth might as well be confessed that, in the present state of our knowledge, the reasons why certain hypermetropes do not develop convergent strabismus are unknown to us.

Not admitting the position of rest as a cause of strabismus, it goes without saying that Dr. Stilling's reasons, with the exception of the 6th (*vide*, p. 278), are unsatisfactory.

The most satisfactory explanation I know of is this: that given the disturbed relations of accommodation to convergence in hypermetropic eyes it is necessary for the patient to learn the art of disassociating his convergence from his accommodation, and to shift his convergence back into the negative field. He who cannot learn to do this or is incapacitated from so doing by a very limited positive range of relative accommodation, will develop strabismus convergens. The majority come by this art naturally, emerging from the struggle with binocular fixation, and hence, that all hypermetropes are not squinters. This theory, of course, applies only to hypermetropes of moderate degrees, for those who have but a slight H have no inducement to squint, while those who are affected with very high degrees of H gain nothing by squinting.

In view of the fact that there is nothing new in this article, that no new theories are advanced, and that the arguments used are all well known to the profession, it may occur to some that the paper had better been left unwritten. I argue, however, otherwise. For in the legitimate struggle for the acquisition of knowledge, man oftentimes follows blindly the creations of his own mind, and is led from the path which leads to truth. And I believe that it is the duty of his professional brethren to raise their voices in protest when, in their opinion, such a departure has been made, and, by discussing the question, to ascertain whether truth is on the side of the new theory, or whether the "old way is the better." That the opinion of one man is, other things being equal, as good as that of another is unquestionable, and were the views expressed in this article the result of my individual investigations and thoughts alone, I would not have presumed to assert that Prof. Stilling had departed from the safe road, but they are the views held by the majority of the most distinguished men in our profession ; they account, furthermore, in a most satisfactory and scientific manner for all the phenomena that present themselves for our consideration. And hence this paper, for I firmly believe that "the old way is the better."

TRANSPLANTATION OF A RABBIT'S EYE INTO THE HUMAN ORBIT.

By CHARLES H. MAY, M.D.,

INSTRUCTOR IN OPHTHALMOLOGY, NEW YORK POLYCLINIC.

IN the *Medical Record* of May 29, 1886, I reported a series of experiments, consisting of the transplantation of the eyes of rabbits. Previous to an account of the operation upon the human being, it may be of interest to give an abstract of the contents of the paper just alluded to:

Twenty-four rabbits were used in the experiments; in eighteen of these, the cornea either sloughed or became sclerosed and shrivelled so that the operation was considered a failure. In six, however, very favorable results were obtained. The failures in the first eighteen cases were attributed to imperfect technique and inability to keep the eyes properly bandaged. In the six successful cases, these difficulties were overcome, and gratifying results ensued; the transplanted organs became attached and preserved their vitality. Blood-vessels could be seen to pass from the orbital conjunctiva to the transplanted globe as early as the fifth day; muscles seemed to form some attachment as early as the third or fourth day. The favorable cases were watched for ten weeks, and at the end of that time the following had taken place: The transplanted organ had preserved its shape and consistence, though it had become a trifle smaller; vascularity was good; muscular action in all directions perfect; the cornea, which immediately after the operations had become opaque, had cleared considerably, so that, although still hazy, the iris was distinctly visible. In all the cases there was neither implication of the healthy eye in any way, nor interference with the general health of the animals, so far as could be ascertained by the temperature and other means.

These favorable results upon rabbits' eyes led me to believe the operation a feasible one in man, notwithstanding that five cases had been reported, all of which were failures. The first case was that of M. Chibret (*Revue Générale d'Ophthalmologie*, May 31, 1885); the second that of M. Terrier; the third that of M. Rohmer; the fourth that of Dr. H. W. Bradford (*Boston Medical and Surgical Journal*, September 17, 1885)—I classify this case as among the failures, notwithstanding that it is reported as a success after eighteen days' observation, since this is the general belief among ophthalmologists, and since no answer was obtained to the writer's letter to the gentleman asking for further information about his case; also because the statement in the writer's report of these experiments doubting the success of Dr. Bradford's case has never been challenged. The fifth case is reported by M. Terrier, October 19, 1885. The results, therefore, were not promising as far as the transplantation of the eyes of rabbits into the orbit of the human being was concerned; my hope of being more successful than previous operators was based upon perfected technique and extensive experience with the operation upon the twenty-four cases alluded to. It seemed reasonable to infer, that if success had attended the last six of the series of experiments in rabbits, in whom the transplanted organ could not be kept absolutely quiet, and who were difficult subjects in other ways, that at least equally favorable results could be hoped for in man, where the patient would himself aid in the chances of the procedure by absolute rest to the organ, cleanliness, and local applications of heat and moisture to facilitate and hasten the process of union between the attached surfaces.

Not long after I received a communication from Mr. W., the editor of a prominent Western paper, in which he inquired whether I would be willing to perform the operation upon him; he had lost the sight in one eye, and had been advised to have it removed so as to avoid implication of the fellow; he described himself as of good physique, of good habits, indulging considerably in athletic sports, and as being desirous of having the experiment tried upon him without any other promise as to results than that even though the experiment failed there would still be sufficient tissue remaining to form a serviceable stump for an artificial eye. This assurance I gave him, and, coming on to New York, he furnished the basis for the following report:

Mr. C. A. W., æt. twenty-nine. Seventeen years ago right eye was injured by an explosion on the 4th of July, a piece of metal perforating the upper lid and injuring the eyeball, but not lodging in it; severe inflammation followed for four weeks, then subsided, leaving the eye completely blind. The blind eye has never troubled him; the sound eye, after wearing a glass which corrected his astigmatism, never gave him much trouble. He wishes the right eye removed because it is unsightly, and because oculists at his home have told him it ought to be removed on account of a possible future effect upon the sound eye.

Present condition:

O. S. V. $\frac{20}{20}$: Hypermetropic astigmatism corrected by $\frac{1}{40}$s $\frac{1}{80}$ cyl. ax. 90°. Ophthalmoscopic examination negative. No ciliary tenderness. Lids normal. Conjunctiva normal.

O. D.: No perception of light. Cornea thinned, opaque, and staphalomatous. No ciliary tenderness. T. + 1. Eyeball slightly smaller than fellow. Conjunctiva normal. Upper lid presents double scar. Movement of eyeball good.

Operation Feb. 1, 1887.

A very large-sized brown buck of the kind known as the Belgian hare, having brown eyes (matching as nearly as possible, though a shade darker than those of the patient), was etherized; the conjunctiva separated at one eighth of an inch from the margin of the cornea all around, and the muscles and sub-conjunctival tissue severed, leaving as much areolar tissue upon the eyeball as was possible; the optic nerve was not divided at this stage, but the eyeball was covered by the lids and attention now directed to the patient. The latter having been anæsthetized in the meanwhile, the conjunctiva was separated from the globe as close to the cornea as possible, a loop of thread was passed through each of the recti muscles with the overlying conjunctiva, and after these muscles had been thus secured, they were cut; the areolar tissue was loosened, keeping as close to the eyeball as possible, so as to leave as much tissue in the sac as could be left; the optic nerve was cut off close to the globe. The stump of the nerve was sought for with the finger, felt, and a single thread of fine catgut passed through it with a needle and forceps specially designed for the operation. These forceps consist of ordinary fixation forceps, with their lower extremity widened and curved, concavity inward, so that when the ends are approximated they represent a circle, the diameter of which is 3½ *mm*, and the edges were slightly rough; the sides of the lower expanded extremity present small openings. The special needle consists of a lance-shaped, pointed, curved needle, the eye being situated very near the point, mounted upon a handle.

The optic nerve having been seized with the forceps, the needle, threaded with fine catgut, was passed through the lateral openings of the forceps and thus through the optic nerve; the suture was caught up from the end of the needle after having traversed the nerve, the needle withdrawn, and the forceps removed; in this way the suture had been passed through the end of the optic nerve with a minimum amount of laceration and without loss of time. Attention was now given to the rabbit's eye, the enucleation of which was completed by cutting the optic nerve, dividing it as far back as was possible, and leaving upon the globe as much areolar tissue as was present.

The suture through the patient's stump was now passed through the optic nerve remaining upon the rabbit's eyeball, and the ends of the two optic nerves were thus approximated and secured by an ordinary knot. The conjunctival sac was then stitched to the rim of conjunctiva remaining upon the rabbit's eye, ten sutures being employed; those inserted opposite muscles included the anterior extremities of these and thus fastened them to the globe. During all this time, the rabbit's globe remained perfectly clear. During the operation saturated solution of boric acid was used freely upon the eye of the patient; no fluid of any kind was applied to the eye of the rabbit, previous experiments having led me to believe that the use of boric acid and of corrosive sublimate had hastened the clouding of the cornea. The eye being freed from blood, the lids were approximated, white vaseline and cotton applied; both eyes were bandaged, pressure upon the transplanted organ being avoided. Hot compresses were ordered; these consisted of four-ply pieces of linen wrung out of hot water; they were applied over the bandage, and supported upon a wire frame so arranged as to avoid pressing upon the eyeball, by resting upon the margins of the orbit.

Feb. 2d. Second day.—Eye felt slightly sore, but no great pain. Removed dressings at the end of twenty-four hours; considerable chemosis and marked œdema of upper lid; cornea smooth, nebulous, but iris distinctly visible; cornea insensitive; there was a moderate amount of sero-purulent discharge mixed with blood. Rebandaged both eyes, and hot applications continued day and night.

Feb. 3d. Third day.—Cornea more hazy, iris being almost indistinguishable; considerable sero-purulent discharge.

Feb. 4th. Fourth day.—Œdema of upper eyelid and chemosis are still considerable; conjunctiva is very much reddened and angry-looking. Cornea is almost opaque, so that iris can scarcely be distinguished; it is smooth, has preserved its form, and is insensitive; the movement of the transplanted organ is good (due to stitches); patient has remained quiet upon the back, urine and fæces being discharged in the recumbent posture; he feels comfortable, and pulse, respiration, and temperature have remained normal; both eyes are still kept bandaged, and the sound eye appears normal.

Feb. 5th. Fifth day.—Patient allowed to sit up an hour in bed. Less œdema of upper lid and less chemosis, though conjunctiva is still very much reddened, and at junction with the transplanted organ a number of small granulations are seen; hot applications are now made for one hour every three hours.

Feb. 6th. Sixth day.—Discharges are sweet, moderate in amount, and sero-purulent in character; some of the stitches were removed; others still in place. Granulation tissue still visible.

Feb. 8th. Eighth day.—Everything had progressed favorably thus far. The cornea was smooth, insensitive, opaque; movement of the eyeball excellent; size the same as on insertion; the sound eye and the general health of the patient had not suffered in the least. Upon removing the dressings to-day, the presence of pigment from the iris shows that an opening in anterior chamber must exist; on examination, no opening can be found, but the lower part of the cornea looks suspicious at one point. Form of eyeball still preserved. Rebandaged.

Feb. 9th. Ninth day.—Upon removing dressings, more pigment of iris was found to have escaped. Examination shows a small ulceration at lower edge of cornea with perforation. The patient said the eye had felt "soft" during the night. Discharge moderate and sero-purulent. The experiment was considered at an end, for although patient was willing to submit to another transplantation, this was not considered justifiable.

The rabbit's eye was removed under cocaine anæsthesia and the operation was quite painful, notwithstanding the free use of the local anæsthetic. A few of the sutures were still in place; the steps of the secondary operation were those of an ordinary enucleation. The muscles were found to have become attached, but the connection was not very firm and could be severed with the hook; here and there the scissors had to be used; the optic nerve was found to have united by loose connective tissue and had to be cut again. After enucleation, the rabbit's eye was found to have preserved its form, was slightly smaller than on insertion, the cornea opaque, considerably thickened, and presenting the perforation already alluded to; lens opaque; vitreous of a boiled-starch appearance. The conjunctival sac was found to be lined by numerous collections of granulation tissue, and swollen and stiffened so that on withdrawing the eyeball the sac did not collapse, but presented the appearance of a hollow globe with a central deep cavity corresponding in size and form to the removed eyeball. The cavity was scraped and the margins of the sac approximated by sutures.

Feb. 21st.—Since last note there has been considerable discharge of a muco-purulent nature from the stump, and the hardness and swelling have gradually disappeared, so that now it presents the appearances of an ordinary stump several days after an enucleation, and is ready for an artificial eye; it is of good size and possesses excellent motility.

In reporting this case I do so with the hope that it may be regarded as a fair test-case; although it is true that one case does not prove much, yet this one is entitled to special consideration in this respect—the patient has had every possible chance of success. Of good physique, with good care and nursing, and with extraordinary patience, he made a capital subject for the experiment; then again I had flattered myself that the technique could not have been much improved; I had sufficient experience with the operation both during the experiments upon rabbits and upon the cadaver, so that there was no hitch in the proceding; were I to do the operation over again I do not know how I could change or improve any of the details—and yet it was a failure! So that I have changed from an enthusiast to a disbeliever in the operation. I do not believe it a feasible one in man, and would not be willing to undertake it again. While smaller portions of tissue may be transplanted with success, the whole eyeball presents too great a mass to have its vitality preserved and make even a fair substitute for the artificial eye.

In conclusion, I wish to express my obligations to Dr. E. Gruening for valuable assistance and suggestions during the operation; it is a satisfaction to know that this gentleman agrees with me in the assertion that the case is entitled to be considered as of value as a good test-case, in which the operation had every possible chance of success, but yet failed.

ON CATARACT EXTRACTION WITHOUT IRIDECTOMY.*

By H. KNAPP.

DAVIEL'S method of extraction—*i. e.*, the "simple method," without iridectomy, has of late been revived and recommended with particular emphasis by French oculists, Galezowski, De Wecker, Panas, and others. Thus far, it has found only a small number of advocates outside of France, yet what I saw of it in Paris last winter, impressed me so favorably that I determined to give the method a fair trial. In order to learn what was known and thought about it in this country, I brought it before the American Ophthalmological Society in July, 1886. At that time my experience with it comprised only six operations. Dr. H. D. Noyes reported on six others, and Dr. Grüning on two. Both gentlemen had witnessed the operation in Paris.

My present communication is based on twenty-nine successive cases—including the six mentioned above—in which I succeeded in extracting the lens without exsecting the iris, and on six cases in which I attempted to do so but did not succeed. Our French confrères have described the method in general and in detail. They claim that they have practised it in hundreds of cases, and that the results have been excellent, superior to Graefe's or any other method, but they have given us no detailed and conclusive statistics. Statistics have their fallacies, they are never entirely objective, always bearing more or less of a personal stamp, yet they give us a better insight into our own as well as another's work than we can obtain from general descriptions, which reflect only our impressions and opinions for the time being. When we think more or less favorably of a method, we are very apt to overlook, forget, or reason away what is adverse to it. Statistics, if we are honest to ourselves, hold up hard facts that often astonish us. I consider it a decided advantage that some of the larger ophthalmic institutions in this country, for instance, the N. Y. Eye and Ear Infirmary and the Massachusetts Charitable Eye and Ear Hospital, publish in their annual reports detailed statistics of that most important of eye operations, the extraction of cataract. From this point of view I have compiled in tabular form the twenty-nine cases of the operation under consideration, so that all may draw their own deductions therefrom. See table, page 56, etc.

---

* Read, in part, before the Section on Ophthalmology, N. Y. Academy of Medicine, Feb. 21, 1887.

I now beg leave to discuss the subject in its various practical bearings.

1.—Preparation of the Patient.

No patient was operated on the day of entrance into the hospital. They were all kept in the hospital one or more days, in order to have their eyes thoroughly clean and free from irritation. The eyes were washed with soap every morning and evening, and Panas' antiseptic (biniodide of mercury, 0.05; alcohol, 20.00; dist. water, 1000.00) was instilled several times daily.

Only one patient was operated in the new *operating-room* of the Institution, which was built in the closest possible adherence to bacteriological principles. From the operating room the patient, with bandaged eyes, was led up one flight of stairs. The next day I found he had extensive prolapse of the iris, although the pupil after the operation had been perfectly round and central. He was restless the first twenty-four hours. I do not know how far the moving of the patient was to blame for the prolapse, but I have operated on all others in their bedrooms, where an operating-chair and a drop-light were always on hand. In Paris I have seen that the patients are operated in operating-rooms,

No.	Name.	Age.	Character of cataract.	Complication.	Date of operation.	Operation.	Reduction of iris.	Healing process.
1	M. Don.	76	Hard.		June 10, '86.	Regular.	Spontaneous.	Plastic iritis.
2	A. Balf.	36	Soft.	Od. white.	11	"	"	
3	M. Cam.	55	Hard.		14	"	"	
4	M. Cas.	60	"		21	"	"	Plastic iritis.
5	C. Woods.	63	"		21	"	"	" "
6	M. Bey.	52	"		July 9	"	With probe.	
7	J. Mar.	65	" Not quite ripe.		26	"	Spont.	
8	E. Mull.	52	Hard.		27	Small piece of cortex scooped out with spatula.	"	
9	O. Dem.	40	Hypermature.		Aug. 13	Regular.	"	
10	H. Alb.	57	Hyperm.	Dacryocystitis.	Sept. 20	Considerable manipulation and introduction of instruments. Rigorous antisepsis.	Stroked back.	Striped keratitis. Pupil partially occluded by thickened capsule.
11	L. Scott.	76	Hyperm. black.	Myopia; liquid vitreous.	22	Thickened capsule removed with forceps. Lens expelled by rotating on horizontal axis. Lower edge escaped first.	Spontaneous. Pupil round.	Very restless patient, throwing himself spasmodically about in his bed at night. Had to be watched and tied.
12	Fr. Müll.	61	Hard.			Regular.	With probe.	
13	M. Wallace.	70	"		Oct. 2	"	" "	
14	Mrs. J. Pretorius.	64	Hyperm.		9	Escape of vitreous after expulsion of lens.	" "	The folded iris left an irregular pupil. Healing good.
15	J. Duffy.	63	Hard.		9	Regular.	Spont.	
16	Mrs. Jones.	67	"		19	"	With spatula.	
17	Mrs. Mills.	67	Morgagnian cholesterinic.	F contracted below.	27	Nucleus rubbed out in pieces. The deaf and uncontrollable patient had to be etherized	To stroke the iris back.	Next days cotton moist, edges of wound white, ant. chamber cloudy, iris dull. Careful cleansing with Panas' solution. Gradual clearing up.
18	Kigg.	70	Hard.	Mac. corneæ and dacryocystit. chronic.	Nov. 1	Regular. Pupil apparently clear. Panas' sol. injected in ant. chamb.	Spont.	From pupillary area a shred of capsule passed over iris to nasal corner of wound. Closure of wound normal; pupil round; but pain and circumcorneal injection and swelling, and cloudiness of pupil for a long time. The shred of capsule shrank from periphery and finally disappeared.
19	Sauter.	64	Hard.		13	Regular.	Spont.	
20	Murr.	40	Semimollis.		Nov. 13	Regular.	Spont.	
21	McLaughl.	40	Traumatic.	Small foreign body in eye.	16	Cortex left.	"	

Iris prolapse or incarceration.	Post. synech.	Length of treatment in days.	Primary result.	After operation.	Ultimate result.	Remarks.
	Numerous.	23	$\frac{10}{200}$		$\frac{20}{70}$ (eight mos.)	
		16	$\frac{15}{200}$		$\frac{8}{200}$	Atrophy of od five years. Other eye less, but S $\frac{15}{200}$ only.
		21	$\frac{20}{100}$		$\frac{20}{20}$ six mos.	
	Moderate.	17	$\frac{20}{100}$			
	"	25	$\frac{20}{100}$		$\frac{20}{70}$ eight mos.	Pupil partially obstructed by capsule. Fundus distinct.
		14	$\frac{20}{70}$		$\frac{20}{30}$	Pupil round, free, partially obstructed by capsule.
		12	$\frac{20}{200}$	Discission five weeks later.	$\frac{20}{70}$	
	Three filiform.	16	$\frac{20}{100}$		$\frac{20}{40}$ eight mos. (not fluently.)	Od surrounded by atrophic band on nasal side.
		13	$\frac{20}{70}$			Isinglass plaster applied on fourth day. Preferred old bandage.
Iris extensively incarcerated. Pupil drawn up, round.	Numerous.	28	$\frac{20}{100}$	Discission four months later.	$\frac{20}{50}$	Old dacryocystitis discharging muco-pus, from which a good cultivation of staphylococcus pyogenes aureus was obtained
Prolapse of iris from second day. Slow but good closure of wound.		35	$\frac{20}{100}$			Prolapse permanent, but free from irritation. Eyes greatly sunken in orbits.
	Two or three filiform adhesions.	14	$\frac{20}{200}$			
	Three filiform adhesions.	22	$\frac{20}{70}$			
No incarceration.		27	$\frac{20}{200}$		$\frac{20}{100}$ four mos.	Unmanageable patient. Pupil and fundus clear; astigmatism. Pupil eccentric; no prolapse.
		23	$\frac{20}{100}$	Discission seven weeks later.	$\frac{20}{30}$	
		17	$\frac{20}{50}$			
Prolapse from second day; disappearing later, leaving eccentric pupil.	Numerous.	26	$\frac{2}{100}$		$\frac{10}{200}$	In secretion at edge of wound micrococci and bacilli found under microscope; grew and liquefied gelatine like staphylococc. pyogenes.
		33	$\frac{8}{200}$			Capsule occluding pupil; has to be split.
	Two small, on inner side.	15	$\frac{20}{200}$	Disc. in five weeks.	$\frac{20}{40}$	
	Some, filiform.	14	$\frac{20}{100}$	Disc. in ten weeks.	$\frac{20}{30}$	
	Some, from injury.	23	$\frac{10}{200}$		$\frac{20}{40}$ in ten weeks.	

No.	Name.	Age.	Cataract.	Complication.	Date of operation.	Operation.	Reduction of Iris.	Healing process.
22	Schuhman.	65	Hard.	Dacryocystit. chronic.	18	Regular and very smooth and quick.	With spatula.	Two days without irritation. Wound united, clean; clear and central pupil. Patient restless, got up. Pain in third night. Infiltration of wound; panophthalmitis.
23	Schultz.	65	"		Dec. 22		With probe.	Patient restless the first day, pain in eye; pupil oval.
24	Pahud.	63	"		22	Patient pressed inordinately. A few drops of vitr. followed lens. Iris folded at periphery.	Stroked back only partially	Well the first three days. Then extensive traumatic hemorrhage by rubbing with hands, repeated three or four times in the course of two weeks in spite of all precaution.
25	Mrs. Smith.	35	Soft.	Diabetes.	Jan. 5, 1887	Regular.	With probe.	
26	H. Walt.	62	Hard.		12	"	Spont.	
27	C. Schlette.	60	"		17	Regular. Some flakes remained in pupillary area.	With probe.	No irritation.
28	McArth.	55	"	Dacryocystit. simplex.	22	Regular.	Spont.	
29	Harris.	33	Morgagn.		30	Nucleus expelled by rotating lower end up.	Spont.	Wounds open at bandaging for days. Iritis.

thence carried into the wards on a litter (Panas), or walked up stairs (DeWecker), or brought up in an elevator (Fieuzal). An operating-room which is used for nothing else and kept dust-free is, of course, preferable to a sick-room. Yet, when there are no other or only a few patients in a room, the air can be kept virtually free from pyogenic germs. It is now well known that infection from the air is the least to be dreaded. Of all the pathogenic germs, the pyogenic seem, however, to be the most extensively distributed in the air, at least they are the only pathogenic ones that have, thus far, been directly obtained in cultivations from the air.

The patients commonly received a bath the day before the operation, and their heads were washed with soap. When they were seated in the operating-chair, the eyes and surrounding parts were washed with soap, wiped dry,

Iris prolapse or incarceration.	Synechiæ.	Length of treatment.	Primary result.	After operation.	Final result.	Remarks.
Iris prolapsed on fourth day when wound had opened.		26	0			The dacryocystit. had been treated for four months, and seemed sufficiently improved to venture operation.
Iris incarcerated, not prolapsed.	No synechiæ. Pupil oval.	29	$\frac{20}{100}$		$\frac{20}{100}$ two months.	Marked astigm.
Upper part of iris drawn back.	Pupil irregular. No synechiæ.	38	$\frac{15}{200}$			Patient uncontrollable.
		15	$\frac{20}{70}$			
		11	$\frac{20}{70}$		$\frac{20}{40}$ in four weeks.	
On second day prolapse of iris along the whole wound, covered with the conjunctival flap. Prolapse gradually disappeared leaving the whole wound free. Pupil oblong. Sphincter in eye.	No synechiæ.	17	$\frac{20}{100}$			
	Small synechiæ above and below.		$\frac{20}{70}$	Disc. on eighteenth day.	$\frac{20}{50}$ $\frac{20}{30}$	

and then washed with corrosive sublimate $\frac{1}{2000}$, or Panas' solution of biniodide and alcohol, or carbolic acid $\frac{1}{50}$. Then Panas' solution was freely instilled into the conjunctival sac and over the cornea; the upper lid was turned, and its conjunctival surface (more particularly its free edge) carefully washed with absorbent cotton moistened with the biniodide solution.

A drop or two of a three-per-cent. or four-per-cent. solution of *muriate of cocaine* was now let fall on the cornea, followed by another drop or two six or seven minutes later. Then the biniodide was again instilled, and the operation begun. Ether was given in several cases; not in as many as might have been desired.

The instruments, of course, *had been previously cleansed and sterilized.* They were washed with soap, boiled water, and the alcoholic solution of biniodide of mercury. For instruments with uneven surfaces—forceps and the like—a soap-brush was used; the others were rubbed with freshly washed linen. All were wiped dry, polished with the same kind of linen, and dipped in the biniodide solution immediately before being used, the liquid being left on them. Special care was taken in cleansing the cystitome, on account of its angles, from which it is more difficult to remove germs than from a straight, polished surface.

The *hands of the operator* and of his assistants were cleansed in the usual way with soap and bichloride of mercury.

2.—Mode of Operating.

The lids were kept open with a *wire speculum* provided with a screw.

The eyeball was steadied with the ordinary *fixing forceps* implanted in the conjunctiva close to the lower corneal margin. A *Graefe's knife* was then, rather quickly, passed through the anterior chamber, making a section through two fifths of the transparent corneal margin, or less, according to the size of the cataract.

If the eye is completely free from irritation, I avoid a *conjunctival flap* as a useless complication; but when there is chronic conjunctivitis or dacryocystitis, I consider a conjunctival flap of advantage. No doubt it increases the danger from primary infection by enlarging the wound, yet with antiseptics we can efficiently guard against the primary infection, but not so well against the secondary, from which the conjunctival flap is a protection. These views are derived from the series of operations under consideration, and they will be spoken of further on. The iris is best avoided by passing the knife *quickly* through the anterior chamber. In none of the cases of the present series did the iris fall before the blade of the knife, nor was it wounded in any way.

As soon as the section is completed, a *cystitome is introduced* and the capsule opened extensively in the centre, the manœuvre being completed with a horizontal stroke in the upper part. If the iris is not prolapsed, the point of the cystitome may in the last stroke be passed underneath its upper part. In several cases pieces of capsule were drawn out with the forceps.

The *lens* is *now expelled* by pressing with a rubber spoon on the lower part of the cornea, as in Graefe's method, or by pressing on the cornea with the lower lid after the speculum has been removed. The latter mode is preferable in complicated cataracts, especially when the suspensory ligament is defective and the lens dislocated. In some cases, in this as in Graefe's method, when I saw that the upper end of the cataract or its nucleus did not present in the wound, but wedged itself into the periphery of the posterior chamber, I pressed it toward the centre of the globe with one hand, while pressure upon the lower part of the cornea with the other moved the lower edge of the cataract up and into the wound. Simultaneous pressure with both hands towards the centre of the eyeball expelled the lens gently and without accident. I am sure that I am not the only one acquainted with this mode of exit, but since I have seen some such cases do surprisingly well, I have studied and adopted it as a method for a certain group or cases.

The *removal of remnants* of lens is most important. Panas lays the greatest stress on this step. He says "the perfection of the result and the absence of operative complications depend chiefly on good cleaning of the pupillary space. Pressure with the fingers, pressure with the curette (he uses Daviel's spoon), repeated introduction of instruments into the anterior chamber—we spare neither time nor trouble to attain our object, and we succeed." One must have seen Prof. Panas do this to believe what an amount of interference eyes are capable of enduring without injury. He says "the antiseptic method has here, as in lithotrity, changed every thing, and nothing need be feared, provided the washing out of the anterior chamber (*le lavage intra-oculaire*) is made (as he does it) regularly."[1] I have endeavored to follow Panas' example, and yet have been cautious with regard to scooping the remnants out. I have preferred to let patients wait until their cataracts are completely ripe in order to avoid extra trouble in the removal of remnants. When the pupil was clear, the eye was closed for a short time to let the iris resume its natural position. This occurred spontaneously in seventeen out of the twenty-nine cases (fifty-nine per cent.). In the others the iris was reduced by rubbing the cornea with the lids or stroking with a probe the folded iris out of the wound and the sinus of the anterior chamber back into its normal position. If, in spite of my efforts, the pupil was not central and round, I made an iridectomy on the spot.

---

[1] Bulletin de l'Académie de Médecine, Séance du 5 Janvier, 1886.

Particles of lens, blood, etc., during the operation were wiped away with absorbent cotton dipped in the alcoholic solution of biniodide of mercury.

The last part of the operation was the *washing out of the anterior chamber*. After the speculum had been removed, the upper lid was held up with the forefinger of my left hand, the patient was directed to look downward, the nozzle of an E. Meyer's lachrymal syringe—which was used for no other purpose—was introduced into the wound, and a few drops of the biniodide solution thrown into the anterior chamber, the nozzle of the syringe passing along the section so as to moisten the wound with the antiseptic from one end to the other. I have avoided injecting large quantities of liquid into the eye, my object being to sterilize the region of the wound, not to kill germs nor to cleanse the pupil by the stream of liquid. When the operation had been quickly performed, and no instruments except the knife and cystitome introduced, I limited the injection to the lips of the wound, and in a few cases did not use the syringe at all, but dropped the antiseptic over the wound with an ordinary atropine dropper. There are no germs within the eye, and the few that may possibly be introduced with the instruments from the conjunctiva are not likely to multiply in an eye that has been operated on smoothly and cautiously. It is a different thing if the cornea and iris are bruised by the pressing of a large lens through an insufficient wound, and if the capsule has been indiscriminately lacerated, especially if particles of cataract and shreds of iris and capsule remain in the section. These conditions prepare the soil for the multiplication of bacteria, and demand the use of efficient antiseptics. In such a case I would irrigate the conjunctival sac and syringe out the anterior chamber freely with the alcoholic biniodide or a watery bichloride (1 : 5000) solution.

When the operation was finished, I instilled two drops of a one-per-cent. solution of sulphate of eserine. Of late, I have also put a small quantity of eserine ointment (0.10 to 10.00 of vaseline) into the conjunctival sac. The closed eyelids were covered with a compress of linen gauze, which was smeared with an ointment consisting of 0.15 of benzoate of mercury to 10.00 of vaseline cold cream. A pad of absorbent cotton steeped in the biniodide solution was spread over the gauze, so as to form a mould over the eyelids ; then dry absorbent cotton was placed on the wet cotton and on the lids of the other eye, both held in position by a flannel roller applied in the manner of the old binoculus bandage, which, in my opinion, still remains unexcelled.

3.—After-treatment.

The patients were *put to bed* with as little disturbance as possible, and requested to lie on their backs as quiet as they could. They sat up in bed while taking their meals, and got out of it to satisfy calls of nature. *Rest* is considered to be of the greatest importance, not only as favoring primary union in general, but more especially in this method of extraction, in order to prevent prolapse of iris. To darken the room is by no means necessary, and never has been, for the bandage is a sufficient protection from too bright a light.

The *next day* the dressing is renewed without opening the eye, except when there is inflammation. In most cases there is a small quantity of mucus on the gauze, probably conjunctival epithelium necrosed by the action of the antiseptic. If otherwise the gauze is dry, the new bandage is left undisturbed for two days. Then the eye is opened and inspected. If the pupil is round and central and no irritation present, the eye is cleansed and bandaged again without any instillations. If the pupil is oblong, eserine solution is instilled, and eserine salve put in the conjunctival sac; if the pupil is round and central, the wound closed, but circumcorneal injection or some pain is present, atropine is instilled. I am inclined to use atropine earlier and more frequently than is recommended in the simple extraction. Wherever shreds of lacerated capsule come in contact with the pupillary edge of the iris, synechiæ are apt to develop. In the present series there were synechiæ in ten cases out of twenty-nine; in no case were they extensive, nor did they lead to the formation of a dense pupillary membrane, yet many of them might have been ruptured had I instilled atropia earlier.

Of the *accidents* occurring during the operation, two cases of escape of vitreous are to be noted (Nos. 14 and 24). In both a few drops followed the exit of the lens. The iris lay folded in the upper part of the anterior chamber, and it was impossible to reduce it either by rubbing or the probe. The wounds united well, without prolapse or incarceration.

4.—Wound Complications.

There were two cases of *incarceration of the iris* (Nos. 10 and 23).

The *first* was in an exceedingly nervous man with a hypermature cataract, the removal of which had been very laborious. The pupil, at the end of the operation, had been completely round. Two days later, when the eye was opened, a considerable portion of the iris lay in the wound without protruding. It was covered by a conjunctival flap. The anterior chamber was restored. There was plastic iritis, but no suppuration, though the patient suffered from chronic dacryocystitis. The wound closed completely, no iris was seen lying in the outer layer of the wound. Four months after the operation S $\frac{20}{70}$ was raised to $\frac{20}{50}$ by a discission.

The *second* case was the man spoken of previously as having been operated on in the operating-room, and led up one flight of stairs. He was restless for the first twenty four hours and had some pain in the eye, but when he lay quiet, after having been told that rest was of the greatest importance, the pain disappeared and the recovery henceforth was undisturbed. S $\frac{20}{100}$, two months after the operation, with marked astigmatism.

There were four cases of *prolapse of iris* occurring within the first three days after the operation.

In case No. 22 the iris was seen lying in the centre of the corneal wound, suppuration being fully developed.

In the case of puriform inflammation (No. 17) the iris was noticed in the centre of the section. It disappeared from view when the inflammation subsided. The pupil was drawn up, the whole sphincter being in the anterior chamber.

The third case referred to an old man, who in his sleep used to throw himself about in spasmodic fits. His was the only case in which the prolapse remained; the recovery being slow but free from inflammation, and the pupil perfectly clear, though drawn up.

In the fourth case (No 27) the iris protruded beyond the corneal wound in its whole extent, but was covered with a conjunctival flap. During the recovery, which was quick and undisturbed, the whole iris disappeared from the outer aspect of the wound. The pupil was oblong, the sphincter completely in the eye; no synechiæ.

In former times I was in the habit of abscising all traumatic prolapses of iris. Of late I have become more conservative with regard to this point. I noticed that prolapses left to themselves mostly disappeared or cicatrized in a surprisingly smooth manner, and it seemed to me that they gave rise to sympathetic trouble less often than when I had abscised them. If I get the cases early, before adhesions with the cornea have formed, I remove the prolapsed iris and stroke the rest back into the anterior chamber, *i. e.*, I make a clean iridectomy. Prolapses from ulcers or wounds that are suppurating I never cut. The iris is a barrier against the entrance of the germs into the interior of the eye, a fact which not only is clinically well known, but which I saw verified by experiments on rabbits in which the uncut iris showed itself very resistant to the action of pyogenic bacteria.

The *healing process* was, on the whole, satisfactory. The two cases of suppurative inflammation, of which the one ended in recovery, the other in loss of the eye, were owing to individual complications, not to the method.

Posterior synechiæ were left in ten cases, but they were not extensive.

More or less *pupillary obstruction* from the lens capsule required *discission* in six cases; in three others it has to be done now, and probably in some others later.

Traumatic after-hemorrhage (No. 24) occurred in a patient who, with the best will, could not control his hands during his sleep nor avoid hurting his eye against the bedding or the wall. He was a stout asthmatic man, who would throw himself about in spite of all precaution and restraint. The blood totally filled the anterior chamber and hung out of the wound in clots. The hemorrhage occurred in a less degree four other times. The blood was absorbed and left a good eye.

Plastic capsulitis with congestion of the iris and ciliary body occurred in one case (No. 18), which was rather remarkable. From the centre of the pupil a shred of capsule passed over the anterior surface of the iris to the inner corner of the wound. It kept up an irritation and I was tempted to open the wound and extract it with a pair of forceps, for I feared that it might be the carrier of infection, the patient suffering from chronic dacryocystitis. When the irritation set in the wound was already perfectly closed, and there seemed to be no longer any communication with the conjunctival sac, if indeed it had ever existed. Under atropine, leeches, and rest I noticed that the shred became smaller and finally disappeared. In the pupil there is now a somewhat dense capsule, which can be split with a knife-needle.

The case of *puriform kerato-iritis* (No. 17) presented a good deal of interest. The cataract was white, not gray. The field of vision was contracted in its lower part. Prognosis unfavorable, but, as the other eye had an immature cataract of the same nature, I advised an operation. When the capsule was opened milky cortex overflowed the anterior chamber. The nucleus came out in pieces. The pupil was clear and central after the iris had been stroked back. When the antiseptic was injected into the anterior chamber the patient made a sudden start, which was followed by prolapse of the iris, and she kept up such a constant motion of the eye that I was unable either to stroke the iris back or to cut it off. I therefore anæsthetized her with ether, reduced the iris, and injected the antiseptic. The pupil was clear, round, and central. The next day the gauze was moist. On the fourth day the edges of the wound were whitish, the cornea hazy, the anterior chamber dull ; a small portion of iris lay in the wound. By cleansing the wound and washing the conjunctival sac out three times daily the inflammation gradually subsided. The pupil was drawn up, but the wound was normal. No sloughing of the cornea, no retraction of the scar, no diminution of the size and tension of the globe had taken place. Sight has improved up to about $\frac{10}{200}$, and promises to be further improved by a discission.

I would say that the inflammation in this case had not been purulent, but lymphatic, had not cultivations from the wound secretion given us a well-characterized growth of staphylococcus pyogenes. Evidently, infection of the wound had taken place, but the inflammation was not intense enough to destroy the eye.

The case of *panophthalmitis* (No. 22) teaches a lesson which is not new. I treated the conjunctivitis and dacryocystitis for months, and did not operate till the discharge had ceased. Yet the conjunctiva was still red and somewhat swollen. Operation regular. Antiseptic precautions rigorous. No reaction for two days. Wound closed, clean ; anterior chamber, iris, pupil, and sight normal. Then patient got up in the night, sought for his purse in the dark, and went about as if he were well. Toward morning pain set in ; in the afternoon I found the edge of the wound infiltrated. The upshot was panophthalmitis.

Two things might, and probably would, have averted this issue : (1) If the patient had continued to be quiet, the wound would probably not have been irritated and infected, as its aspect had previously been excellent. (2) If I had made a conjunctival flap it would probably have prevented the germs from invading the corneal wound on the third day.

In all cases of conjunctivitis and dacryocystitis I shall henceforth—unless my views change—make a conjunctival flap. The conjunctival flap does not obviate, it perhaps favors, primary infection—*i.e.*, infection during the operation. But against this we may protect our patient by scrupulous asepsis and antisepsis. Sterilizing the conjunctival and lachrymal sacs before the operation, irrigating the wound during the operation, and sterilizing the anterior chamber and the conjunctiva after it, will prevent primary affection, as it did in the case under consideration. When the eye has to be kept bandaged for a few days, the bacteria, multiplying in the conjunctival sac, may come in contact with the edge of the conjunctival wound, where, as experiments demonstrate, they do no harm, but the conjunctival flap, the inner surface of which is united to the underlying tissue, prevents them from reaching the edge of the corneal wound. If the lips of the wound do not apply accurately, but, as frequently occurs, the corneal lip projects somewhat over the scleral, bacteria will have easier access, and, if the patient be restless and move his eye, they are directly stroked into the wound, the wound is not only more efficiently inoculated, but the abundant tissue juice, poured out from its irritated lips, furnishes an appropriate nutriment for the microbes.

The safest treatment in dacryocystitis is, of course, to destroy the sac, postponing the operation until the conjunctiva has become white.

5.—Results.

The *visual acuteness* obtained has been as follows:

S.	No. of cases.	S.	No. of cases.
$\frac{20}{20}$ . .	2	$\frac{20}{200}$ . .	1
$\frac{20}{30}$ . .	3	$\frac{15}{200}$ . .	1
$\frac{20}{40}$ . .	4	$\frac{10}{200}$ . .	1
$\frac{20}{50}$ . .	3	$\frac{8}{200}$ . .	1
$\frac{20}{70}$ . .	5	$\frac{6}{200}$ . .	1
$\frac{20}{100}$ . .	6	0 . .	1

If with regard to the perfection of the operative results, we call those cases ideal recoveries in which the pupillary area is not obstructed by inflammatory products, the pupil is central and movable, even if a few filiform adhesions are present, we have obtained *eighteen perfect or ideal recoveries among twenty-nine cases—i.e.*, 66 %.

There was one case of loss. All the imperfections in the healing process that have been noted can be called unimportant; namely, a few cases of oval or displaced pupil, and three cases in which the capsular obstruction was made somewhat denser by inflammatory products, yet not so much as to require any other after-operation than a simple discission with a knife-needle.

6.—Comparison of the Two Methods.

If we compare the simple extraction with the extraction combined with iridectomy, we find as **advantages** of the former the following:

1. It preserves the natural appearance of the eye.

2. The acuteness of vision, other things being equal, is greater.

3. Eccentric vision and "orientation" (correct localization of objects in the visual field) are much better, adding a great deal to the comfort and safety of the patient.

4. Parts in direct connection with the ciliary body, such as shreds of the capsule and iris, are not so liable to be locked up in the wound and thus transmit morbid conditions to the most vulnerable part of the eye, the ciliary body.

5. It may not necessitate so many after-operations.

As **disadvantages** may be mentioned:

1. The technique of the operation is more difficult in all its parts: (*a*) The section must be larger, to let the lens pass through an aperture, the size of which is diminished by the iris lying in it; it must be more accurate to secure coaptation, and it must be more rapidly performed in order to prevent the iris from falling before the knife. (*b*) The opening of the capsule requires a deeper introduction of the cystitome into the anterior chamber. (*c*) The expulsion of the lens is more difficult, and (*d*) the cleansing of the pupillary area is much more troublesome than in the combined extraction.

2. Prolapse of iris and posterior synechiæ are more numerous.

3. It requires a quieter and more manageable patient during and after the operation than is needed in the combined extraction.

4. It is not applicable to all patients, whereas combined extraction can be used as a general method.

7.—Indications for the Iridectomy.

This brings me to the last point which I want to consider, namely, *when should an iridectomy* be made.

1. When in case of fluidity of the vitreous and rupture of the suspensory ligament of the lens, the cataract on pressure does not present in the wound, but only vitreous escapes.

This occurred in the case of Mr. E. S. R., æt. sixty-five, operated on Oct. 11, 1886. After a regular corneal section, fluid vitreous escaped. When the cystitome was pressed on the capsule, the lens receded. The speculum was removed, and an unsuccessful attempt made to expel the lens by pressure through the lids. A further escape of vitreous was the only consequence. The speculum was reinserted, a small piece of iris exsected, the speculum removed, and the lens in its capsule pressed out with the lids, without further loss of vitreous. Recovery undisturbed. Sight good.

2. When the section is insufficient and the iris, in the attempt to expel the lens, has been pushed into the wound, and vitreous presents or escapes.

This happened in the first patient on whom I tried the method. The exsection of the protruding iris made the completion of the operation easy. Result good.

3. When during the operation the iris has been bruised or injured.

This happened in the case of Brother C., æt. sixty-seven, who had a hypermature cataract. During a tedious attempt to extract the thickened centre of the anterior capsule with a pair of forceps, the iris was caught between the branches, and so much bruised that I thought it advisable to exsect the injured portion. After this was done the lens came out easily, and the whole capsule was then extracted without an effort. Recovery and result good.

4. When the sphincter is unyielding, more especially when a peripheric piece of iris falling before the knife has been exsected. I would rather cut a rigid sphincter than expose the patient to prolapse of vitreous in the attempt to overcome its contraction by undue pressure.[1]

5. When the iris, after the expulsion of the lens and cleansing of the pupillary field, proves irreducible.

---

[1] I successfully acted on this principle in a case operated on, Feb. 27, 1887.

This happened in three patients, all of whom, after the iridectomy, made a good recovery. I include in this category all cases in which the pupil does not become perfectly central and round. They indicate lack of elasticity of the iris tissue, and are not to be trusted, though in some of them the paralysis of the sphincter may be transient. It is better to exsect a piece of iris on the spot than to run the risk of a subsequent prolapse. When a prolapse is found on the second day, it may or may not be cut, but after the second day it is advisable, I think, not to touch it. The experience in the series under consideration has been in favor of leaving it alone.

To conclude, I may be allowed to **express my opinion on the value of the method** of extraction without iridectomy, as follows:

Simple extraction is an operation of the highest order, and practicable in the majority of cases with the same degree of safety as the extraction combined with iridectomy. In a considerable minority, however, the latter method is preferable; in a number of cases the indications for the iridectomy manifest themselves before, in others only during, the operation.

A FAMILY HISTORY OF BLINDNESS FROM GLAUCOMA.

By Dr. LUCIEN HOWE, of Buffalo, N. Y.

THE hereditary tendency of glaucoma is already too well known to be worthy of any special comment, Von Graefe having called attention to this phase of the disease many years ago.[1] The present example is reported because of the very unusual number in the same family who were thus afflicted, there being eight well-marked cases in three generations.

This family, Donnocker by name, originated in the township of Boston, Erie County, New York. In the first generation to which I would call attention there were six children—Fanny, Michael, Elizabeth, George, Dorothea, and Simon. Of these, George was affected. His symptoms, as gathered from his son, who is a clergyman and an intelligent man, and also from another member of the family, were substantially as follows : Vision good till about forty years of age. At that time he consulted Dr. Munn, of Rochester, on account of some failure of sight. The disease assumed an inflammatory type. In about six months the vision of one eye was lost, and within three years more he had become virtually blind in the other, the symptoms throughout being such as indicated clearly an attack of glaucoma of the inflammatory variety. This was the only victim in the generation mentioned. None of the children of his brothers and sisters, as far as can be learned, were troubled with any disease of the eyes, except such as might easily be accounted for, as due to conjunctivitis or simple affections.

---

[1] Arch. f. Ophth., xv., 3, 228. *Jour. of Amer. Med. Ass'n*, vol. ii., p. 185 : "A Case of Hereditary Glaucoma," H. Harlan.

The descendants of George, however, were not so fortunate. His wife had normal vision. Their children were Martha, George, Catharine, Mary, John, and Caroline. Of these George and Catharine were similarly affected. The history of this George, who is now a clergyman, and sixty years old, is as follows: When twenty-eight years old, imperfect vision was noticed in the left eye. This was more apparent at intervals, in the manner frequently met with in glaucoma. One year later an iridectomy was made on the left eye by Dr. Noyes, of New York, but even by that time the vision had decreased to fingers at four feet, at which point it remained February 25, 1880. The patient was seen last on July 3, 1885, and then he was totally blind in that eye. The other eye was entirely destroyed by an accident when he was a boy.

I will conclude this branch of the family and consider George's descendants before referring to his sister Catharine or her children.

The wife of this George—the second—had also perfect vision. Their children were Luella, Delbert, Arthur, Ellsworth, and Emma. Luella, now Mrs. B., lives in Freeman, Steuben county, New York. She was first seen by me on the 28th of March, 1883, and was then thirty-two years of age. She stated that her vision was good till four years before, being able to do sewing and other fine work of a similar nature. At that time she began to have pain in the left eye, which subsequently increased with all the characteristics of glaucoma; the vision meanwhile failing until nine months before, when the left became completely blind. On examination this eye was found to present a typical picture of absolute glaucoma, and she also had a chronic glaucoma in the right, but good perception of light. An iridectomy was performed, but no improvement resulted.

Her brother Arthur was seen in January, 1884. The vision was but slightly impaired, it being perfect in one eye and equal to $\frac{20}{40}$ in the other. In that eye, however, there was a perceptible excavation of the disc, and a slight contraction of the field of vision.

Another brother, Ellsworth, I have also examined, but the eyes are unaffected. The youngest child, Emma, has not escaped so easily. She was seen first on the 6th of December, 1883, and was then seventeen years of age, and lived at Stony Fort, Tioga County, Pa. She stated that the vision began to fail about three months previously in both eyes at the same time. With her the disease was of a non-inflammatory character, but advanced rapidly, so that at the time of the consultation the vision of the right was equal to only perception of light, and with the left she could count fingers at three feet ten inches. An iridectomy was at once made upon both eyes. In the right there was little, if any improvement, but in the left, the vision increased to fingers at six feet, and the field, by accurate measurement, was considerably more than doubled. This record was made soon after the operation. A subsequent examination, however, showed that the vision had increased to fingers at ten feet.

So much for the clinical history of the descendants of the second George Donnocker. Let us now consider his sister Catharine and her descendants. I am not able to speak of her case from personal examination. Two independent accounts, however, from different members of her family, agree in the fact that her vision was good until she was twenty-five years of age, and then began to fail gradually. Within a little over four years she had entirely lost the vision of one eye, and a few months later the remaining one also became blind. One of her children, who described her symptoms by letter, says that the eyes are "very hard when pressed upon," and her subjective symptoms are such that one may be able with fairness to infer that her trouble was also of a glaucomatous nature. She married a man by the name of Eiss, whose vision was normal, as far as can be learned. Their children were Daniel, George, John, and Celia. Of these the first and the third were affected. Daniel Eiss, who lives in Boston, N. Y., was seen on the 20th of May, 1879. He was then twenty-nine years of age. He stated that his vision was good till three years previously, when both sclerotics were noticed to be slightly injected and the vision imperfect. In the summer of 1877 these symptoms disappeared, but in the following winter and during all of 1878 they grew gradually worse. At the time of the consultation referred to, in both there was slight ciliary injection, with the veins in the sclerotic dilated, pupil wide and immovable, the optic disc with deep excavation, $T + 3$, and $V = \frac{1}{\infty}$. These, with other symptoms, characterize it, like the others, as absolute glaucoma. No operation was made.

The second son, George Eiss, lives in Buffalo, and is now about thirty years of age. I am told he considers his vision perfect, as does also his sister Celia. The third son, John, is the final example to which I would call attention. He was first seen on the third of June, 1879, and also lived in Boston, N. Y., and was at that time twenty-five years old. He stated that the vision began to fail about six years previously, but until a few months before he could see large objects quite readily. At the time of the examination his left eye presented all the typical features of chronic glaucoma, with vision equal to perception of light. During the three or four months previously he noticed that the vision of the right was also somewhat affected, and at the time referred to, the symptoms of glaucoma were well defined. He had a typical excavation, and vision equal to twenty seventieths. He was seen at intervals until the 24th of January following, and continued to decline operation until the field of vision contracted so greatly that it was impossible for him to carry on his occupation as a farmer, with any degree of comfort. An iridectomy was accordingly made upon this eye. The acuteness of vision was nearly doubled, and the field increased also in proportional degree. At present the left, of course, remains blind, but with the one operated upon he has no further difficulty. The youngest sister is, thus far, unaffected.

In this generation several are already married, but their children are too young to expect any development of glaucoma.

To recapitulate. We find in this family eight individuals more or less affected. Of these I have been able to examine and satisfy myself as to the existence of glaucoma in six, and the history is sufficiently definite to warrant the conclusion that the same trouble existed in two others. Out of the eight, four have been operated upon, and the iridectomy has at least prolonged the duration of vision for three. Five have been totally blind in both eyes, two in one eye, and in one the vision is slightly affected in one eye.

Examples of some hereditary tendency to glaucoma already exist in the literature of the subject, but I am not aware of any case where an opportunity was offered of determining the existence of the disease in so many individuals of the same family.

The following tabular arrangement indicates by the italics those who were affected:

		Luella.
		Delbert.
Fanny.	Martha.	*Arthur.*
Michael.	*George.*	*Ellsworth.*
Elizabeth.	Catharine.	Emma.
(*George.*)	Mary.	
Dorothea.	John.	*Daniel.*
Simon.	*Caroline.*	George.
		John.
		Celia.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY DURING THE FIRST AND SECOND QUARTERS OF THE YEAR 1886.

By H. MAGNUS, Breslau ; C. HORSTMANN, Berlin ; and A. NIEDEN, Bochum.

WITH THE CO-OPERATION OF

C. E. Fitzgerald, Dublin ; E. Marckwort and P. von Mittelstädt, Antwerp ; Dantone, Rome ; Hirschmann, Charkow ; S. M. Burnett, Washington ; Schjötz and Ole Bull, Christiania, etc.

Translated by Drs. F. E. D'Oench and A. Schapringer, New York.

Sections I.–V. Reviewed by Prof. H. MAGNUS.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

a.—TEXT-BOOKS, MONOGRAPHS, TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS.

1. Buck. Reference handbook of medical sciences, vol. ii. New York, 1886, Wm. Wood & Co.

2. Corradi. Della cecità in Italia e dei modi di prevenirla. *Ann. Univ. di med. e chir.*, 1886, vol. cclxxv. According to the latest count there were 76.3 blind to 100,000 inhabitants in Italy. The etiology and statistics of blindness in that country have been thoroughly investigated in this paper.

3. Fieuzal. Coup d'œil sur les laboratoires spéciaux. Destination et but du laboratoire de la clinique nationale ophthalmologique des Quinze-vingts. *Bull. de la clin. nat. ophth. des Quinze-vingts*, Jan.–March, 1886.

4. Haab. Sketch-book for entering ophthalmoscopic observations of the fundus. Zürich.

5. Kerschbaumer. The blind of the duchy of Salzburg, with remarks on the spread and causes of blindness in general. A study for physicians, hygienists, and national economists. Wiesbaden, 1886, J. F. Bergmann.

6. Klein. Compendium of ophthalmology; for physicians and students. Vienna and Leipzig, 1886, 460 pp.

7. Linnartz. The eyes of the deaf-mute. Aix-la-Chapelle, 1886.

8. Meyer. Text-book of ophthalmology. Fourth enlarged and revised edition. Berlin, 1886, 602 pp.

9. Schmidt-Rimpler. Ophthalmology and ophthalmoscopy. Wreden's collection of short medical text-books, vol. x., second revised edition. Brunswick, 1886, 642 p.

10. Stellwag von Carion. New papers on practical ophthalmology. Supplements to the text-book of Dr. Karl Stellwag von Carion. With the aid of the clinical assistants, Dr. Bock and Dr. Herz. Vienna, 1886.

11. Skrebitzky. The distribution and frequency of blindness in Russia, and the distribution of the blind among the different provinces of the empire. *St. Petersb. med. Wochenschr.*, No. 4, 1886.

12. Tipton. The negro problem from a medical standpoint. *N. Y. Med. Jour.*, May 22, 1886.

13. Vossius. Guide to the use of the ophthalmoscope; for physicians and students. Berlin, 1886.

14. Zepler. The influence of intermarriage on the descendants, with special reference to congenital blindness. Inaug. Diss. Breslau, 1886.

The second volume of Buck's (1) valuable book maintains the standard established in the first, and will prove useful both to the specialist and to the general practitioner. We shall call attention to those articles only that have reference to ophthalmological subjects and are marked almost without exception by their condensed form, care, and accuracy. Diseases of the choroid are described by W. C. Ayres; cocaine, by W. P. Balles; color-blindness (with a colored plate), by B. Joy Jeffries; conjunctivitis, by Samuel Theobald; affections of the cornea, with a beautiful chromo-lithographic plate showing ten pathological conditions of this tissue, by Frank Bueler; diplopia, by John Green; development of the eye, by Benj. Sharp; diseases of the lids, by W. C. Ayres; injuries of the eye, by W. S. Dennett; tumors, by Adolf Alt.

BURNETT.

FIEUZAL (3) shows the necessity of a laboratory connected with the ophthalmic clinic, as it exists at the hospice des quinze-vingts. Hänsell briefly describes its arrangement and methods of working, and sets forth the objects of the laboratory, whence an atlas of the anatomy and histology of the eye will soon be issued.

V. MITTLESTÄDT.

The ophthalmoscopic sketch-book of HAAB (4) is a very practical aid in preserving pictures of the fundus, enabling even observers not skilled with the pencil to do so. We believe the book is equally useful for practice and instruction in ophthalmoscopy.

KERSCHBAUMER'S (5) study of the subject of blindness is an excellent one, and although we do not agree with him on many points, especially in the latter half, this does not prevent us from recognizing its importance.

In the first section of the book, Kerschbaumer discusses blindness in Salzburg. In that duchy there are 15.28 blind to every 10,000 inhabitants. The danger of becoming blind constantly increases, according to Kerschbaumer, after the age of fifteen, but this increase is not rapid until after the age of fifty, a result which nearly agrees with that previously found by me.

KLEIN (6) has prepared a compendium, intended for physicians and students, from his larger text-book of ophthalmology, which appeared in 1879.

LINNARTZ (7) makes the following demands: (1) The teacher of deaf-mutes must be familiar with the present status of ophthalmology and its most important laws; (2) the physician must give an opinion of the vision of every deaf-mute child before it enters the institution; (3) the more advanced deaf-mute scholars must be instructed in the preservation and care of their eyes, sight being more important to them than any other sense.

The fourth edition of MEYER'S (8) excellent text-book has appeared. Its value has been so generally recognized that a recommendation of it must seem superfluous. The progress which ophthalmology has made since the last edition of the book has been duly recognized and incorporated in the new one.

In view of the unreserved favor with which SCHMIDT-RIMPLER'S (9) text-book was received when it appeared in 1885, it is not surprising that already a new edition has become necessary. It is undoubtedly one of our best text-books.

STELLWAG (10) treats particularly of en- and ectropium and the operation for cataract.

TIPTON'S (12) experience confirms that of the reviewer as to the absence of trachoma in the negro. Eye operations do well, and though the negroes nearly all have syphilis (? K.), its course is usually very mild. BURNETT.

VOSSIUS (13) has published a very useful guide to ophthalmoscopy for students and physicians. The optical and physical conditions are presented in a condensed form, and in a manner adapted to the necessities of the general practitioner.

ZEPLER (14) comes to the following conclusions in regard to the injurious influence of intermarriage : (1) Blood-relationship among absolutely healthy families is not a source of danger to the offspring ; (2) the injury done the latter by blood-relationship can be explained by potential heredity, the influence of which is sometimes increased by accidental causes ; (3) collateral heredity occurs in a comparatively large number of cases apart from consanguinity ; but the actually existing conditions can only be determined by statistics of marriage among relatives.

b.—STATISTICAL PAPERS.

15. AMSTERDAM. Vereeniging tot oprichting en instandhouding eener Inrichting voor Ooglijers. Destiende Verslag. May, 1886.

16. Seventeenth annual report of the BROOKLYN EYE AND EAR HOSPITAL, for the year 1885.

17. CHISOLM. Eighth annual report of the Presbyterian Eye, Ear, and Throat Charity Hospital, for 1885.

18. FIEUZAL. Compte rendu de la clinique pour l'année 1885. *Bull. de la clin. d' ophth. nat. des quinze-vingts*, vol. iv., No. 1, Jan.–March, 1886.

19. HALTENHOFF. Quatrième rapport de la clinique ophthalmique du Molard. Genève, 1886.

20. MEYHÖFER. Report on his ophthalmic clinic during the years 1884 and 1885, with remarks on cataract-operations. Görlitz, 1886.

21. NEWARK CHARITABLE EYE AND EAR INFIRMARY. Sixth annual report.

22. SAMELSOHN. Cologne Ophthalmic Institute for the Poor. Eleventh annual report, for the year 1885. New patients, 3,831; 475 operations.

23. SCHENKL. Report on the operations performed at the German ophthalmic clinic at Prague, from April, 1883, until May, 1886. *Prager med. Wochenschr.*, 1886, No. 17.

24. SCHIESS-GEMUSEUS. Ophthalmic Institute at Basle. Twenty-second annual report, from Jan. 1, 1885, to Jan. 1, 1886. Basle, 1886.

25. WICHERKIEWICZ. Eighth annual report on the Ophthalmic Institute for the Poor of Posen, for the year 1885. Posen, 1886.

26. WILLS' EYE HOSPITAL. Report for the year 1885.

In AMSTERDAM (15), Gori, Gunning, Juda, and Rijnbeck treated 5,728 patients. Into the house 519 persons were admitted. Cataract-operations 46, squint-operations 61, iridectomies 51.

Surgeons in BROOKLYN (16) are Mathewson, Prout, and Rushmore. Number of eye-cases treated in 1885, 4,131; 9 extractions.

CHISOLM (17) treated 4,291 eye-cases. Cataract-extractions, 124; iridectomies, 69; enucleations, 54; eviscerations, 9; squint-operations, 115. BURNETT.

FIEUZAL (18) treated 9,332 new patients, and performed 1,412 operations. Cataract-extractions, 355, among them 231 senile cataracts. Good results in 81 per cent., moderate in 15 per cent., failures 4 per cent. v. MITTELSTÄDT.

HALTENHOFF (19) treated 3,236 new patients in two years. Operations, 146. One third of the entire number were children. Almost 26 per cent. of the whole number were new-born children with blennorrhœa neonatorum.

MEYHÖFER (20) reports 5,071 new eye-patients. Extractions, according to Graefe, 64; massage of the lens, 13; enucleations, 26; exenterations, 7; divisions of the optic nerve, 4.

In NEWARK (21) Kipp treated 2,552 eye-patients. Cataract-extractions, 14; iridectomies, 7; squint-operations, 18; enucleations, 3. BURNETT.

During the three years that SCHENKL (23) had charge of the Prague clinic, he performed 949 more important operations: among them, 144 flap-extractions, 123 of which with good, 11 with moderate result; ten failures. Frontal extractions 159, 148 of them with good, 9 moderate, result; 3 failures.

Schiess-Gemuseus (24) treated 1,855 new patients, and performed 181 operations: among them, 56 extractions, 53 with good, one with moderate, result, and 2 failures; 7 enucleations; 25 squint-operations. A number of very detailed clinical histories is added.

Wicherkiewicz (25) treated 3,612 patients. A paper on operating unripe cataracts, and on cocaine, is added.

In Wills' Hospital (26) the number of patients was 6,631; the number of operations, 1,181; among them, 111 extractions.

Burnett.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

a.—GENERAL PATHOLOGY AND DIAGNOSIS.

27. Chibret. Skiascopie; ses avantages; sa place en ophthalmologie. *Arch. d' ophth.*, vol. vi., No. 2, March–April, 1886.

28. Duci. Altro innesto di bulbo di coniglio sull'uomo. *Gaz. med. ital. lomb.*, vol. xlvi., April, 1886, and *Ann. di. ottalm.*, vol. xv., p. 51.

29. Gellé. Ophthalmotonométrie. *Gaz. des hôp.*, 1886, p. 464.

30. Gillet de Grandmont. Inoculation expérimentale de le tuberculose de l'œil. *Rec. d'ophth.*, Feb., 1886.

31. May. Enucleation with transplantation and re-implantation of eyes. *Med. Rec.*, May 29, 1886.

32. Pierd'houy. Secondo tentativo di innesto di occhio di coniglio sull'uomo. *Gaz. med. ital. lomb.*, vol. lxvi., No. 9, Feb., 1886.

33. Terrier. Quelques recherches et quelques remarques sur la greffe oculaire. *Arch. d'ophth.*, vol. vii., 1, Jan.–Feb., 1886.

34. Uhthoff. The diagnostic importance of the reflex immobility of the pupil. *Berl. klin. Wochenschr.*, 1886, No. 3.

35. Valk. The diagnosis of astigmatism with the ophthalmoscope. *Med. Rec.*, June 12, 1886.

Chibret (27) calls skiascopy the method of determining refraction, described by Cuignet as keratoscopy, and practised especially in England. He thinks that particularly in spasm of the accommodation it is more reliable than the examination in the upright image. As the name indicates, the method is based on the observation of shadows. v. MITTELSTÄDT.

The transplantation of enucleated eyes has lately been attempted by a number of observers, whose conclusions have mostly been unfavorable. The reviewer fully agrees with them in condemning this latest addition to our operative procedures. He never obtained a satisfactory result in a longer series of experiments (about 30), and will soon report at greater length in a dissertation on the subject. A review of the following papers is appended.

DUCI (28) reports a second attempt of the lately deceased Pierd'houy to transplant a rabbit's eye into the human orbit. It was performed on a young woman of thirty, whose right eye was to be enucleated on account of beginning sympathetic ophthalmia of the left. After detaching and fixing the tendons of the muscles to the conjunctiva, and then to the skin of the forehead, the diseased eyeball was removed and the rabbit's eye, which had just been enucleated, was put into its place. After a failure to unite the stumps of the optic nerve, the conjunctiva and the ends of the tendons were attached to the band of conjunctiva surrounding the cornea of the rabbit's eye. The momentary cosmetic effect was surprising. When the antiseptic bandage was removed on the seventh day, the eyeball was painless, firmly united, and movable in all directions, but the cornea uniformly hazy. Two days later its necrosis began, followed by perforation and escape of the lens. The sclera remained united with Tenon's capsule, but the final outcome, as in the first case, was a painless, atrophic stump, well adapted for wearing an artificial eye. DANTONE.

PIERD'HOUY'S (32) case was that of a coppersmith twenty-five years old. Strictest antisepsis during and after the operation. On the third day the conjunctiva had become attached, and the cornea was sensitive beyond doubt. Every thing went well until the sixth day, when the cornea became hazy, a central ulcer developed, which perforated on the eleventh day, and on the fifteenth the lens escaped, and the result was atrophy of the globe. The conjunctiva and sclera remained united and were nourished ; and as the stump was free from pain and irritation, an artificial eye could be worn upon it. DANTONE.

TERRIER (33) has prepared a compilation of the attempts made to transplant the eye of an animal into the human orbit, and reports two observations of his own. With the exception of Bradfort's case, in which the result was still satisfactory two months and twenty days later, they were all failures. In Terrier's first case the transplanted eye became gangrenous, and was gradually cast out, although a broad strip of conjunctiva around the cornea and as much episcleral tissue as possible had been preserved. In the second case, in which Terrier had partially operated according to Bradfort (suture through muscle and conjunctiva), the cornea perforated on the nineteenth day, followed by escape of contents of the globe, whereupon, in view of the experience of Rohmer, who had seen sympathetic ophthalmia produced by such a stump, it was removed. v. Middlestädt.

May (31) gives the details of twenty-four operations on rabbits, and from the results obtained the author believes the operation in man a justifiable one. (He has changed his opinion. See his paper in this volume. K.) Burnett.

Gellé (29) tests tension by the resistance the globe offers to sound, and uses a modification of Parsonval's telephone for this purpose. Marckwort.

Gillet de Grandmont (30) introduced a tubercle taken from the lung of a human corpse into the anterior chamber of a rabbit. Forty-nine days later fifteen to twenty small tubercles were observed upon the iris. On the sixty-eighth day the eye was enucleated, the animal being apparently in good health; seventeen days later it died of general tuberculosis. As the tubercle was not taken from the human corpse until forty-eight hours after death, it was placed for a few moments in a concentrated (1 : 4) alcoholic solution of carbolic acid, which probably destroyed the septic germs, but not the tubercle. Marckwort.

Uhthoff (34) found reflex immobility of the pupil combined with preservation of reaction on convergence in 136 among 166 cases, under the following circumstances: In tabes in 92 cases = 67 per cent. of all cases. The pupils were of unequal width in one fourth of all cases; unilateral paralysis of accommodation in only 5 cases.

In dementia paralytica in 12 cases.
In syphilis in 11 cases.
In other cerebral affections in 8 cases.
In multiple sclerosis in 2 cases.
In railway spine in 2 cases.
In injury of the head in 1 case.
In congenital feeble-mindedness in 1 case.
In abuse of tobacco in 1 case.
In hystero-epilepsy in 1 case.
In hemianæsthesia dextra in 1 case.
No cause assignable in 3 cases.

Reflex immobility of the pupil without reaction on convergence was found in 30 cases, as follows:

In syphilis in 8 cases.
In tabes in 3 cases.
In progressive paralysis in 2 cases.
In injury in 2 cases.
In "cold" in 1 case.
In beginning tuberculosis of the brain in 1 case.
In tumor cerebri in 1 case.
No cause assignable in 12 cases.

VALK (35) believes that the majority of ophthalmoscopic observers cannot perfectly control their accommodation, and for that reason the axis of the correcting cylinder must be at right angles to the vessels that are most distinctly seen without a glass, or with the weakest glass, and that in hypermetropic astigmatism it should be parallel to them. BURNETT.

b.—GENERAL THERAPEUTICS.

36. GUAITA. Asepsi e antisepsi. Rendiconto delle sedule della Soc. ottalm. ital. *Ann. di ottalm.*, vol. xiv., 5, 6.

37. NOYES. Antiseptics in eye-surgery. *N. Y. Med. Journ.*, Jan. 16, 1886.

38. DE WECKER. Notice historique complémentaire d'actualité. *Arch. d'ophth.*, vol. vi., 3, May–June, 1886.

GUAITA (36) insists that asepsis, *i. e.*, the prevention of infection through parasites, should be distinguished from antisepsis, the destruction of the microbes. Most of the substances now in use act as aseptics, especially iodoform and boracic acid, while sublimate and, to a certain extent, carbolic acid act as antiseptics. DANTONE.

NOYES (37) expresses himself thoroughly in favor of antiseptic precautions in eye-surgery. The procedures he recommends are: The avoidance of medicated solutions containing infective material, or contaminated instruments; to remove from the eye all infective material; to have the hands perfectly clean; and to see that the surroundings are clean and free from all infective germs. As an antiseptic, he prefers the sublimate or biniodide of mercury. BURNETT.

DE WECKER (38), in his answer to Panas (*v. Arch. d'ophth.*, vol. vi., No. 2, March–April, 1886, p. 97), points out the difference between his and Critchett's method, and claims for himself the introduction of the section including exactly one third of the circumference of the cornea and lying in the limbus. He does not believe that injections into the anterior chamber sterilize the eye, but mechanically wash away germs that may have entered. He thinks that the re-introduction of the old flap-extraction will be due to the efforts of several authors, but not less to antiseptics, local anæsthesia, syringing out the anterior chamber, and eserine. Panas, in a note to de Wecker's communication, maintains the correctness of his former assertions. v. MITTELSTÄDT.

III.—INSTRUMENTS AND REMEDIES.

a.—INSTRUMENTS AND TECHNICAL CONTRIVANCES.

39. BELLJARMINOW. The usefulness and accuracy of the test-types now in use for determining acuteness of vision. *Wjestnik ophthal.*, Jan.–Feb., 1886.

40. GREEN. On spectacle-lenses of asymmetrical curvature. *Amer. Jour. Ophth.*, March, 1886.

41. GROENOUW. Contributions to the mathematical calculation of the action of prismatic glasses. Inaug. Diss., Berlin, 1886.

42. GUAITA. Letto per operazioni ottalmiche. *Ann. di ottalm.*, vol. xiv., 5, 6.

43. JULER. A refraction ophthalmoscope with electric light. *Centralbl. f. prakt. Augenhk.*, 1886, p. 48.

44. LANDOLT. Du maniement des instruments en chirurgie oculaire. Conférence d'ouverture du cours de chirurgie oculaire fait à l'école pratique de la faculté de médecine. *Le Progr. méd*, 1886, No. 1, p. 3.

45. LEROY. Sur l'ophthalmomètre de precision. *Ann. d'ocul.*, vol. xcv., p. 209.

46. MANGIN et CHIBRET. Phare ophthalmologique. *Ann. d'ocul.*, vol. xcv., p. 235.

47. MASSELON. Présentation de la seconde édition de l'echelle métrique. *Ann. d'ocul.*, vol. xcv., p. 236.

48. PRIESTLEY SMITH. Small hand-lamp for ophthalmic purposes. *Centralbl. f. prakt. Augenhk.*, 1886, p. 112.

49. REYNOLDS. The prolate lens of Dr. Fox. Barsch's sphero-cylinders on one surface. *Amer. Journ. Ophth.*, April, 1886.

50. SCHMIDT-RIMPLER. Speculum. *Centralbl. f. prakt. Augenhk.*, 1886, p. 48.

51. SCHNELLER. Trachoma forceps. *Centralbl. f. prakt. Augenhk.*, 1886, p. 48,

With the aid of Helmholtz's ophthalmometer BELLJARMINOW (39) carefully examined the test-types of Snellen (three different editions), Schweigger, Wecker, Monoyer, Reich, Krükow, and Adamück, and from the results obtained he calculated the angle under which they are seen at the given distance. He found marked differences, not only between the various letters of the same series, but also between different lines of the same letter, or even different parts of the same line. Lines which appear exactly under an angle of 60″ (seconds) are rarely found on any of the cards. As movements of the person during the examination of his vision cannot be avoided, giving rise to small errors, the author thinks that slight inaccuracies in the letters (up to 3″) may be overlooked. He gives the following analysis of the test-types examined: 1. Types of Snellen in feet. Among ten letters examined, he found marked differences (up to 6.4″) in two; differences between lines of the same letter seldom occur. Execution of the letters very satisfactory. He finds that Snellen's test-types are the most useful of all. HIRSCHMANN.

GREEN (40) shows how all forms of compound lenses can be ground on revolving wheels, the radius of the wheel forming the radius of one cylinder, and the radius of the curvature of the rounded edge of the wheel constituting the radius of curvature of the cylinder at right angles to it. This last can even be made elliptical in form. BURNETT.

GUAITA (42) describes an elegant, adjustable, iron operating-bed which he had constructed at Siena, the head-rest of which in particular has been carefully made. DANTONE.

JULER (43) has arranged 9 + and 15 − glasses on a disc; the concave mirror, placed obliquely, is perforated at its upper edge, and receives the electric light from below, supplied by a small Leclanché battery.

MANGIN and CHIBRET (46) have constructed a special lamp for operations on the eye. (Helot-Trouvé's photophor is to be preferred, because it need not be kept in a particular vertical direction, so that light can fall directly from above on the object examined. —Rev.) MARCKWORT.

PRIESTLEY SMITH (48) has constructed a lamp consisting of two nickel tubes sliding over each other, the length of which is 170 *mm* and the diameter 45 *mm*. The lower tube contains, enclosed in a capsule with bayonet-catch, a candle, the flame of which is always kept at the same height by a spring. The upper tube contains two lenses, placed opposite each other, of one and two inches focal length. The foci of these lenses coincide with the centre of the flame of the candle, being in one straight line with it.

REYNOLDS (49) has demonstrated on his improved Snellen's phakometer that the three cylinders in one lens, as ground by Barsch and described by Dr. L. W. Fox, are not simply sphero-cylinders, but have actually three foci. The fact however that the lines near their point of intersection cast halos upon the disc of the instrument shows an amount of irregular curvature which makes them unsuited to the correction of regular astigmatism.

BURNETT.

SCHMIDT-RIMPLER (50) writes as follows : " The specula generally in use are open to two objections : they are not strong enough, so that they can be pressed together by the patient's lids, and their removal cannot be rapidly accomplished, especially when they are fastened with screws. I have, therefore, constructed a speculum which, being made of steel, is less compressible, and the point of fixation of which is only at a short distance from the branches holding the lids ; a spring is introduced between the branches, so that the speculum can be rapidly closed by pressure on a metallic button, and therefore easily removed. It can be used for either eye."

b.—REMEDIES.

52. GLÄSSNER. Iodol. *Centrabl. f. prakt. Augenhk.*, 1886, p. 16.

53. KAZAUROW. Antipyrine in ophthalmology. *Wratsch*, No. 7.

54. LANDESBERG. The application of lanoline in ophthalmology. *Centrabl. f. prakt. Augenhk.*, 1886, p. 94.

55. DE WECKER. Injections et passements à l'éserine et antisepsie oculaire. *Ann. d'ocul.*, March–April, 1886.

GLÄSSNER (52) found that iodol acts just as favorably as iodoform in corneal ulcers and hypopyon-keratitis. Good results were also obtained in phlyctenular and trachomatous pannus with a 2 per cent. salve, also in superficial opacities of the cornea, and in one case of persistent serous iritis with opacities on the posterior surface of the cornea. In phlyctenulæ of the conjunctiva it failed. The salve seems, however, to accelerate the healing in the last stages of trachoma, and to act beneficially in blepharitis ciliaris. Glässner thinks that iodol can take the place of iodoform in ophthalmology.

KAZAUROW (53) obtained good results with antipyrine in all cases of headache or ciliary pain accompanying diseases of the eye (keratitis, corneal ulcers, glaucoma, headache after cataract-extraction, foreign bodies in the orbit). In 14 cases a single dose of 1 grm. was sufficient. In a few cases the author had to give this dose three times before relief was obtained (optic neuritis, scleritis). The author prefers this remedy to salicylate of sodium, as it does not produce any unpleasant general symptoms.

HIRSCHMANN.

LANDESBERG (54) is satisfied that lanoline is the best basis for salves to be used on the eye. It does not become rancid, prevents decomposition of the drug, and does not irritate the eye in the least. It is of somewhat greater consistency than cosmoline and vaseline, and therefore does not melt so readily when in contact with the globe. It is rapidly absorbed. It takes up water easily, and an excess of it can therefore be readily removed from the eye by irrigation.

DE WECKER (55) recommends the injection of eserine into the anterior chamber in extraction of cataract, as it prevents prolapse of iris, favors healing, and suppresses secretion. He washes out the anterior chamber with eserine in hypopyon-keratitis, after sclerotomy.

IV.—ANATOMY.

a.—GENERAL AND COMPARATIVE ANATOMY.

56. CIACCIO. Gli occhi semplici de Ditteri vaguagliati coi composti. *La Spallanzani*, vol. xv., 2–3.

57. MORANO. Caso di anoftalmo congenito. *Ann. di ottalm.*, vol., xv., 1.

CIACCIO (56) compares anatomically the simple eyes of the diptera with the composite ones, and the retina of the facet-eyes with that of the eyes of vertebrates.

MORANO'S (57) case of congenital anophthalmus was that of an otherwise healthy, normal child, three months old, whose four brothers and sisters were similarly affected. They all died in their first year, probably from the effects of the miasma of those swampy regions. DANTONE.

b.—LIDS AND MUSCLES.

58. Motais. Recherches sur l'anatomie humaine et l'anatomie comparée de l'appareil moteur de l'œil. *Arch. d'ophth.*, vol. vi., 2.

59. Podwisotzky. The regeneration of the epithelium of Meibom's glands. *Wjestnik ophth.*, Jan.–Feb., 1886.

Motais (58) in this concluding article publishes his studies on the mechanism of the movements of the eye, and the part played by Tenon's capsule, the lateral sheaths, the optic nerve, fascias, and fat. For the details of his experiments on the corpse, see the original. He found that the outer and inner duplicatures of Tenon's capsule follow the movements of the globe. The former is laid in folds on the side on which the muscle acts ; on the other side it is stretched. The orbital fat also moves. In the state of rest the eye is kept in position by the muscles, aponeuroses, lids, nerves, and blood-vessels. When one of the recti muscles contracts, the orbital end of the fascia "aileron ligamenteux" is stretched, the opposite one relaxed. The contraction of the muscle and the corresponding "aileron lig." furnishes a support for the periocular fatty tissue, against which it is pressed like a cushion, thus preventing the lateral dislocation of the globe. It is, therefore, not the "aileron lig." of the antagonist that plays this part. The "ailerons" are, therefore, checks to mobility, as was already assumed by Tenon. Motais considers them besides "agents modérateurs," which act the whole time the muscle is contracted. In a case of paretic insufficiency of the external rectus this could be cured by dividing the "aileron" of the same side. This operation, which confirms the experiments on the corpse, is, however, not advocated, as it has not yet been sufficiently studied, and, besides, is not an indifferent one on account of the injury to the fatty tissue. To facilitate further studies in this direction the author describes the anatomical conditions of the different muscles, their fascias and their connection with the neighboring muscles, etc., without an accurate knowledge of which the operation must not be attempted. v. Mittlestädt.

Podwisotzky's (59) experiments were made on rabbits, which have well-developed Meibomian glands. The glands were irritated by an incision parallel to the edge of the inverted lid, which touched the glands. The process of regeneration takes place only in the peripheric layer of the glands, which may, therefore, be called the formative layer. Hirschmann.

c.—RETINA AND VITREOUS.

60. FALCHI. Sull' istogenesi della retina e del nervo ottico e contribuzione alla patologia della retina. *Gazz. d. clin.*, 1886, No. 2.

61. HAENSELL. Recherches sur le corps vitré. *Bull. de la clin. nat. ophth. des quinze-vingts*, Jan.–March, 1886.

FALCHI (60) describes the development of the retina in embryos of the dog and ox, and the behavior of the retina in adult rabbits after injuries to it, and after injections of pus into the vitreous. DANTONE.

According to HAENSELL'S (61) investigations the vitreous of the new-born consists of a central and a peripheric portion, of which the former forms Cloquet's canal and the zonula Zinnii; the latter, the vitreous proper and the hyaloid membrane. The vitreous is genuine connective tissue, not only in embryos but also in young persons. The cells of this tissue form nets, are arranged in lamellæ, and their offshoots form many anastomoses. The vitreous tissue is covered with endothelium, from which, afterwards, the hyaloid membrane develops. Karyokinetic figures were found in the posterior parts of the vitreous; from the latter, therefore, the future growth proceeds. As the development progresses, the protoplasm of the cells is converted into a transparent mass, and there remains only a reticulum of protoplasmatic threads, at the intersections of which there are small shining bodies, the remnants of the former nuclei. Between the different layers there is liquid. v. MITTELSTÄDT.

V.—PHYSIOLOGY.

a.—GENERAL PHYSIOLOGY.

62. CHARPENTIER. L'intensité des sensations lumineuses. *Arch. d'ophth.*, vol. vi., 1, Jan.–Feb., 1886.

63. DENISSENKO. The question of the changes produced in the eye by light. *Wojenno-med. Jour.*, Jan.–Feb., 1886.

64. HELMHOLTZ. Hand-book of physiological optics. Hamburg and Leipzig. First, second, and third parts; second revised edition.

65. IMBERT. Calcul de l'effet prismatique des verres décentrés. *Ann. d'ocul.*, vol. xcv., p. 146.

66. KOLLER. On the visual field. *Wiener med. Wochenschr.*, 1886, No. 9.

67. Michel, J. Topography of the temperature of the eye. *Arch. f. Ophth.*, vol. xxxii., 1.

68. Rampoldi. Sopra un fenomeno visivo suscitato della atropina. *Ann. uni. di med.*, vol. cclxxv., fasc., 824, 1886. Sopra alcuni fenomeni di contrasto visivo. *Ann. di ott.*, vol. xiv., 5, 6.

69. Schubert. The position of the head in writing. *Arch. f. Ophth.*, vol. xxxii., 1.

70. Uhthoff. The interdependence of acuteness of vision and the intensity of illumination. *Arch. f. Ophth.*, vol. xxxii., 1.

In accordance with the results of former papers CHARPENTIER (62) (*Arch. d'ophth.*) has constructed several curves, which show the ratio between the increase of the intensity of a source of light and the corresponding power of perception. The two factors do not increase in the same proportion, as the power of perception does not increase proportionately to the increasing illumination. The greatest differences are found when the intensity of illumination is very slight. The ratio between two perceptions of light is therefore not the same as that of the corresponding intensities. The same laws hold good for colors. v. MITTELSTÄDT.

DENISSENKO (63) compared the anatomical conditions of the retina and choroid of various species of animals which had been kept in the dark for some time before death, with the retina and choroid of similar animals which had been exposed to more or less intense light before death, and found marked differences Under the influence of light the blood-vessels of the choroid are not so well filled, while the hæmoglobin disappears, penetrating through the membrana vitrea into the pigment epithelium. The perivascular spaces of the chorio-capillaris, which in dark eyes are filled with yellowish lymph, are emptied under the influence of light. The lymph enters the retina. The pigment epithelium seems to be the source of the pigment, but not of the visual purple, which, together with the liquid surrounding the cells and the rods, comes from the choroid. Under the influence of light, most complicated, important changes in form, size, and position take place in all parts of the retina. Most of the elements increase in size, while the layers become thicker. The author thinks that light produces a state of physiological œdema in the retina or parts of the retina. (The changes observed by the author in the outer layers of the retina are essentially the same as those described by Engelmann and Gradenigo.—Rev.)

HIRSCHMANN.

As the older edition of his physiological optics had disappeared from trade, HELMHOLTZ (64) has concluded to prepare a new edition of that excellent work, for which he will have the thanks of all ophthalmologists. A short recapitulation only can be given here of the three parts which have thus far appeared. In the first seven paragraphs a description of the anatomy of the eye is given. The next nine are devoted to the dioptrics of the eye, the laws of refraction in systems of spherical surfaces, the dispersion-images on the retina, the mechanics of accommodation, the dispersion of colors in the eye, astigmatism, the entoptic phenomena, the reflection of light from the fundus, and the ophthalmoscope. HORSTMANN.

KOLLER (66) found that when the eyeball is compressed until amblyopia ensues, the obscuration of the visual field always begins on the nasal side, while a portion of retina surrounding the optic nerve retains its function.

MICHEL (67) found that the mean temperature in the anterior chamber is 31.9°, while at the centre of the vitreous it is 36.1°, which probably is also the mean temperature of the centre of the lens. The low temperature of the anterior chamber rapidly rises 2–3° when the lids are closed. Applications of ice reduce the temperature 13–15° in a minute and a half.

RAMPOLDI (68), while suffering from conjunctivitis, put a drop of atropine into the eye at night by mistake instead of the zinc solution. After the lapse of a quarter of an hour he observed, to his surprise, a pale, trembling light, which seemed to cling to the edges of the lids, and lasted about five minutes. He subsequently repeated the experiment on himself and others in a darkeened room, and found that the phenomenon is regularly observed during the first half hour after the instillation of the atropine—at the beginning, therefore, of the paralysis of accommodation. He refers this phosphene to the tension of the peripheric portions of the retina, produced by the stretching of the zonula, due to the rapidly beginning disappearance of the tonus of the ciliary muscle. The process is probably the same as that which causes the well-known phosphene of accommodation. That the phosphene has its origin in the periphery of the retina the author infers from the fact that, in a case of retinitis pigmentosa, where the peripheral parts of the retina had lost their function while central vision was still relatively good, the phosphene in question could not be produced. The author found that duboisine acted similarly to atropine, while weaker mydriatics (cocaine, jaborine), which have only a slight influence on the accommodation, or none at all, and the myotics, fail to produce the phosphene.

DANTONE.

b.—IRIS.

71. HAAB. Observation of a new reflex action of the pupil. *Correspondenzbl. f. Schweizer Aerzte*, 1886, No. 6.

72. HEDDAEUS. The reaction of the pupil to light: its test, measurement, and clinical importance. Wiesbaden, 1886: J. F. Bergmann. A review of this excellent, lucid, and exhaustive paper cannot be given here, but we desire to call the particular attention of our colleagues to it.

c.—RETINA.

73. EXNER. The manner in which the periphery of the retina exercises its functions, and the seat of the after-images. *Arch. f. Ophth.*, vol. xxxii., 1. According to Exner, the periphery of the retina is superior to the centre in certain intensities of illumination and a certain rapidity of change. The physiological reason for this sensibility of the periphery is found in the ease with which it is exhausted and the rapidity of regeneration. Exner then upholds his view against that of Filehne, maintaining that the after-images have their seat in the retina, the positive one of the same color and the positive complementary one in a layer of the retina nearer the vitreous, the negative complementary one in a layer nearer the choroid.

Sections VI.–XI. reviewed by DR. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

74. BJELOW. On glasses. *Wjestnik ophth.*, March–April, 1886.

75. FÖRSTER. The treatment of myopia. *Breslauer ärztl. Zeitschr.*, 1886, No. 4.

76. SCHWABE, G. Report on the examination of the eyes of the children of the "Realschule" at Rendnitz. From the tenth annual report of that school, 1886, p. 4.

77. SMITH, PRIESTLEY. On means for the prevention of myopia. *Ophth. Rev.*, 1886, No. 56, p. 153.

78. STEFFAN. Myopia at the "Gymnasium" at Frankfort. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 1, p. 267.

BJELOW (74) elaborates his former statements on the influence of glasses on the dynamic balance of the ocular muscles. He calls attention to the fact that correction of the myopia diminishes the lateral divergence or converts dynamic balance into latent convergence, while correction of hypermetropia diminishes the convergence at disposal. He then submits prismatic deflection in decentration of spherical glasses to a renewed examination. He believes that decentration by approach is practicable to the extent of 7 *mm* on each side, and decentration by removal to the extent of 4–6 *mm*. Woinow's statements, which are calculated for decentration up to 4 *mm*, are therefore incomplete. The author also discovered mistakes in them. He has calculated a more complete table, for which see the original. HIRSCHMANN.

FÖRSTER (75) attributes the origin and development of myopia, in the first place, to convergence of the axes of the eyes, the ocular muscles thereby exerting a pressure upon the eyeball and thus increasing the tension within it. As a result, the sclera and choroid become ectatic at the weakest point, the macula lutea. When the posterior pole is turned outwards in convergence, the optic nerve drags at that portion of the sclera situated at its temporal side, and also at the choroid lying upon it. The result is ectasia of the sclera, followed by atrophy of the choroid. As the increasing myopia demands an increasing convergence, and as the latter in turn produces an increase of tension, it is evident why the myopia frequently remains progressive. Although axis-myopia cannot be cured, yet we must try to prevent it, and, if once established, to check its development. Reading and writing should then be performed only at the proper distance. In young persons with a strong power of accommodation the myopia should be entirely corrected with the proper glasses. In those cases of myopia in which for ordinary type a greater distance than 25–30 *cm* cannot be obtained with concave glasses, combinations of concave glasses with prisms (base inwards) are advised. For details see the author's elaborate publication on the subject in these ARCHIVES, vol. xv., p. 399.

SCHWABE (76) found among the scholars of the Rendnitz school 29 per cent. myopic. He also noticed that the number of myopes, as well as the degree of myopia, increased from the lower to the higher classes. Of 85 scholars the father was said to be myopic in 26 cases, the mother in 15, and both parents in 5 cases. The highest degrees could invariably be traced to heredity.

Priestley Smith (77) recommends a desk properly constructed for writing and reading, and a frequently repeated examination of the eyes as to their vision and refraction, in order to prevent the spread of myopia.

Steffan (78) believes that the fight against school-myopia, or, more properly speaking, against the myopia the result of education, can only be successful when it is directed against too high aims and against methods of education which overburden the scholars with near work, especially work to be done at home. The teacher can do more to prevent myopia than the hygienist. The school-house constructed in accordance with all the demands of hygiene cannot alone prevent the development and growth of myopia.

VII.—LIDS.

79. Anke. Three cases of traumatic coloboma of the lid. *Centrlb. f. pr. Aug.*, 1886, p. 9.

80. De Beck, D. Hard chancre of the eyelids and conjunctiva. Contributions from the ophth. clin., Med. College of Ohio, 1886, No. 3.

81. Benson, Arthur. The more modern operations for trichiasis. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 18.

82. Dujardin. Ankyloblépharon partiel et symmétrique. *Rev. clin. d'ocul.*, 1886, No. 5, p. 98.

83. Ewetzky, Th. Contribution to the knowledge of coloboma-cysts. Inaug. Diss., Moscow, 1886.

84. Fano. Emphysème des paupières provoqué par l'action de se moucher. *Journ. d'ocul.*, Feb., 1886.

85. Gilmore, A. P. A case of symblepharon of the lower lid with an operation. *Journ. Amer. Med. Assoc.*, April 24, 1886.

86. Norton, G. S. Malignant tumors of the eyelids and orbit. N. Y. T. C. Rankin, 1886, No. 12.

87. Panas. D'un nouveau procédé opératoire applicable au ptosis congénital et au ptosis paralytique. *Arch. d'ophth.*, vol. vi., 1, p. 1.

88. Poncet. Bactériologie du chalazion. *Soc. franç. d'ophth.*, April 28, 1886.

89. RAMPOLDI. Saggio di operazioni practicate sulle palpebre. *Ann. di ottalm.*, vol. xv., 1, p. 23.

90. ROBERTSON, ARGYLL. Central blepharoraphia. *Ophth. Soc. Unit. Kingd.*, March 11, 1886.

91. TYTLER, T. Spasmodic ectropion treated by the eye-speculum. *Brit. Med. Journ.*, 1886, p. 163.

92. VASSAUX. Bactériologie du chalazion. Séance de la soc. de biol., June 19, 1886.

ANKE (79) reports three cases of coloboma of the lid, produced by a blunt force. The rupture of the lids always took place at the convex edge of the tarsus. Sutures were applied and the healing was favorable in every case.

DE BECK (80) presents a compilation of the cases thus far observed of hard chancre of the lids and conjunctiva.

In partial trichiasis without ectropium BENSON (81) makes use of electrolysis. He attaches a needle to the negative pole of a small Leclanché element, and a larger plate to the positive pole. He then passes the needle into the follicle, and closes the current by bringing the plate in contact with the temple or region of the brows. After twenty seconds the needle is withdrawn, and the hair can easily be extracted, the follicle having been destroyed. In extensive trichiasis with or without ectropium Dianoux's operation as modified by Spencer Watson is indicated. After dividing the lids two incisions are made through the skin parallel to the edge of the lid, the one, as near as possible to the lashes, must be deep enough to meet the intermarginal incision, the other must only penetrate the skin of the lid. The upper flap must then be introduced beneath the flap containing the lashes and fastened with a suture at each end, while the latter takes the place of the skin flap. Thus the lashes are raised the full breadth of the flap, and are firmly supported above by the transplanted skin. In cases in which this operation is not sufficient, a strip of mucous membrane is transplanted from the inner surface of the lip to the mucous membrane of the eye. The edge of the lid is divided in such a manner that the anterior portion contains all the lashes with their roots. In the posterior portion two parallel incisions of proper length are made through the mucous membrane, and into the gap thus made a piece of mucous membrane from the lips is transplanted.

In a child seven month old, which had kept its eyes closed for three weeks in consequence of an eruption on the face, DUJARDIN

(82) observed ankyloblepharon in shape of a reddish membrane, which occupied symmetrically in both eyes the whole space between the outer commissure and the outer edge of the cornea, and which sprang from the conjunctiva of the lids, about one *mm* from the ciliary edge. The lids themselves had not grown together, neither was there any connection between the membrane and the globe. The membrane was divided in a horizontal direction, and the conjunctival insertion abscised, whereupon the child recovered. Arlt reported a very similar case in the report of the Ophthalmological Society, Heidelberg, 1881, p. 126. The author agrees with Arlt in assuming that the cause of the peculiar disease must be sought in a previous croupous conjunctivitis with organization of the membrane, but thinks this conjunctivitis is not one of the ordinary forms.

v. MITTELSTÄDT.

EWETZKY (83) reports twenty-two cases of formation of cysts in the lower lid, fourteen occurring in one eye only and eight in both ; they were associated with congenital microphthalmus or anophthalmus, among them two observations of his own. Of the fourteen unilateral cases the eye was healthy in four cases, in the other ten there was micro- or anophthalmus. The cysts are produced by the failure of the fœtal cleft to close after inflammation in this region, and therefore are probably staphylomas which have detached themselves from the globe.

GILMORE (85) reports a case in which the symblepharon was detached and a flap of conjunctiva dissected from around the cornea and stitched to the ball over the denuded spot. The lid and ball were kept apart by a silver plate which entirely filled the space from canthus to canthus, and which was held in place by wires passed through two holes in the end and through the cheek.

BURNETT.

NORTON (86) gives the history in full of the following cases : (1) epithelioma of the lids ; (2) epithelioma of inner canthus ; (3) epithelioma of both upper and lower lids ; (4) melanotic encephaloid carcinoma of the palpebral conjunctiva of the left eye ; (5) tumor of the right caruncula lachrymalis ; (6) encephaloid sarcoma of the orbit. A full account of the autopsy in the last case is added.

BURNETT.

PANAS (87) describes a new method of operating for complete ptosis. The principle is not new, as the frontal muscle takes the place of the levator, and consists mainly in introducing and healing in a vertical flap springing from the tarsal edge of the lid beneath a bridge-flap situated at the edge of the orbit. Panas operates as follows : After fixing the skin of the forehead, a horn-plate is introduced and an incision made, concavity downwards, from one commissure to the other, corresponding about to the upper edge of the tarsus, leaving, however, in the middle a piece of skin undivided about 8 *mm* broad (afterwards the base of the flap). From the inner ends of these two incisions another vertical one is made to the dividing line between lid and brow near the orbital margin, where their upper ends are united by an incision, 2 *cm* long, concave downwards and continued a little beyond the other two. Finally, an incision, 3 *cm* long, is made parallel to the one last mentioned, just over the brows. The skin lying between the incisions, which must go to the periosteum, is detached without injury to the fascia tarso-orbitalis. The flap formed on the lid is loosened, pushed under the other, and its upper edge united by sutures with the upper edge of the incision along the brow. To prevent ectropium a suture is applied at both sides of the flap, which includes the ligamentum tarso-orbitale and the conjunctiva, and, passing subcutaneously, is fastened to the upper edge of the superciliary incision. The author reports cases which were operated according to this method with good results, and recommends it for complete ptosis, as he thinks that the methods generally in use are sufficient for the lighter cases. v. MITTELSTÄDT.

PONCET and BOUCHERON (88) found microbes in the chalazion. The latter made pure cultures and injected them into the tarsus of rabbits, and thus succeeded in producing a number of chalazia.

RAMPOLDI (89) describes four plastic operations performed by himself on the lids, among which one for ectropium of the upper lid by the substitution of tissue according to Gradenigo is worthy of note, the result of which was very satisfactory. Gradenigo removes the lashes of both lids, and then unites the latter by tarsoraphy. After union has taken place, a curved incision is made through the lower lid from one canthus to the other, and the mucous membrane is sutured to the cutis ; the lower lid supplies the defect in the shortened upper lid. DANTONE.

In cases in which, after enucleation, no artificial eye can be worn, ROBERTSON (90) recommends central blepharoraphy, to prevent irritation of the conjunctival sac and distortion of the lids, which result from the lack of a prothesis.

Tytler (91) cured spasmodic ectropium by the repeated introduction of the speculum.

Vassaux (92) did not find any microbes in chalazia which had not ulcerated ; he thinks that Poncet and Boucheron were deceived. Marckwort.

VIII.—LACHRYMAL APPARATUS.

93. Darrier. De l'extraction de la glande lacrymale dans les cas de larmoiement incoercible. *Gaz. med. de Paris*, 1886, No. 8, p. 88.

94. Debierre. Trois cas d'hypertrophie de la glande lacrymale. *Rev. gén. d'ophth.*, 1886, No. 4, p. 145.

95. Montanelli, H. Poche parole sulla cura delle malattie delle vie lagrimale. *Boll. d'ocul.*, vol. viii., 8, p. 205.

96. Morano. Contribuzione alla terapia delle vie lagrimali. *Ann. di ottalm.*, vol. xiv., 5–6.

97. Prout, J. S. Operations for the relief of lachrymal conjunctivitis and other injurious effects of retention of the tears. *N. Y. Med. Jour.*, 1886, No. 387, p. 485.

98. Ravà. Intorno ad un nuovo apparecchio per le injezioni medicamentose da praticarsi nelle vie lagrimali. *La Spallanzani*, vol. xv., 4.

99. v. Reuss. Congenital absence of all four lachrymal points. *Wiener med. Presse*, 1886, No. 7.

Darrier (93) recommends extirpation of the lachrymal gland in cases in which epiphora cannot be checked, or in which a firm scar prevents the reopening of the tear passages.

Marckwort.

Debierre (94) reports three cases of partial removal of the hypertrophied lachrymal gland, performed at Meyer's clinic. The operation is very simple : After inversion of the lids and previous instillation of cocaine, a longitudinal incision is made through the conjunctiva and the aponeurosis beneath it, the tumor (the hypertrophied gland) detached from the surrounding tissue with scissors, drawn out, and abscised with one cut. The hemorrhage can easily be checked by compression. The wound is closed with one or two sutures. As only a part of the gland is removed, the patient can still weep with that eye, though the quantity of the tears is somewhat diminished in comparison with the other eye.

Marckwort.

In two cases of dacryocystitis, MONTANELLI (95), besides probing the canal, irrigated it for half an hour with 500 grms of an antiseptic solution, and found that the catarrhal secretion and lachrymation soon ceased. DANTONE.

MORANO (96) believes that constrictions of the lachrymal canal are generally located in the upper part of the sac, or at least result from an inflammation of the mucous membrane at that point; the neglect of this circumstance is frequently the cause of the failure of the operation. In order to facilitate the medicamentous treatment of the mucous membrane, the author slits the lower canaliculus, not only upwards, as is usually done, but also downwards, and thus opens the apex of the sac by a linear incision. For this purpose he uses a knife, narrow at the end, and bearing a button like Weber's, but becoming much wider towards its base. DANTONE.

In obstinate cases of lachrymal conjunctivitis in which there is a displacement of the punctum, PROUT (97) has found a modification of the operation proposed by Critchett of great value. This consists in slitting the punctum and the canaliculus for a short distance, and then cutting out a portion of the wall and adjacent conjunctiva with the scissors. The histories of four cases are given. BURNETT.

Instead of a syringe RAVÀ (98) douches the lachrymal canal with a perforated probe, which is connected by means of a rubber tube with a balloon filled with water. DANTONE.

v. REUSS (99) found that in a boy, aged twelve, all four lachrymal points were absent, while the papillæ were present and the canals were represented in the lower lids by furrows; in the upper lids they were wanting.

IX.—MUSCLES AND NERVES.

100. BERRY, G. A. Note on a case of strabismus divergens with homonymous diplopia. *Ophth. Rev.*, vol. v., No. 53, p. 67.

101. DU BOIS REYMOND, C. On measuring strabismus. *Centralbl. f. prakt. Augenhk.*, 1886, p. 1.

102. FROST, A. The early treatment of convergent strabismus. *Brit. Med. Jour.*, Jan. 16, 1886.

103. GILLET DE GRANDMONT. Du défaut de fusion comme cause de strabisme. *Rec. d'ophth.*, 1886, No. 5, p. 261.

104. HIRSCHBERG, J. Contribution to the knowledge of strabismus and the operation for it. *Centralbl. f. prakt. Augenhk.*, 1886, p. 5.

105. JAVAL. La théorie de la vision binoculaire élucidée par un cas de strabisme avec vision triple. *Soc. franç. d'ophth.*, April, 1886.

106. KALT, M. Recherches anatomiques et physiologiques sur les opérations du strabisme. *Thèse de Paris*, 1886.

107. LANDOLT. Procédé de ténotomie dans l'insuffisance musculaire. *Soc. franç. d'ophth.*, April, 1886.

108. MORRISON, RAY J. Two cases of strabismus with choroidal atrophy. *Amer. Jour. Ophth.*, vol. iii., 6, p. 158.

109. MOTAIS. Observations anatomiques et physiologiques sur la strabotomie. *Soc. franç. d'ophth.*, April, 1886.

110. PIERD'HOUY. Sull' avanzamento muscolare. *Ann. di ottalm.*, vol. xv., 1, p. 94.

111. ROOSA, ST. J. The result of the operations for convergent squint. *Med. News*, vol. xlviii., 6.

112. DE ST. GERMAIN, L. A., et VALUDE. Traitement du strabisme. *Rev. mens. des malad. de l'enfance*, Jan., 1886, p. 25.

BERRY (100) reports a case of divergent strabismus with homonymous diplopia. The strabismus had existed for several years, but the diplopia had begun to manifest itself only nine months ago in consequence of exhaustion. The external rectus was divided and the internal rectus advanced. Although the visual axes were now parallel, the homonymous diplopia was increased. This condition must be ascribed to paresis of the abducens, the result of exhaustion and catching cold. Of course the homonymous diplopia was increased by the operation.

DU BOIS REYMOND (101) describes the method devised by Hirschberg of measuring the degree of strabismus on the perimeter by the corneal reflex.

According to FROST (102) most cases of convergent strabismus are due to hypermetropia. If the children are given the proper convex glasses when they begin to squint, the eyes, in most cases, become straight again. The result is certain, when the strabismus diminishes or disappears entirely after the instillation of atropine and the paralysis of accommodation is complete. Where glasses cannot be worn and an operation cannot be performed on account of the youth of the patient, the eye which does not squint should be covered for a few hours every day, so that it may not become amblyopic.

Gillet de Grandmont (103) reports a case of diminished power of fusion as the cause of strabismus. Marckwort.

Hirschberg (104) determines the deviation of the squinting eye according to a method similar to that of Landolt (*cf.* "Gräfe-Sämisch's Handbook," vol. iii., p. 235), from the position of the reflex image of the cornea in that eye. He assumes five principal groups. The first includes the cases in which the corneal reflex is seen materially nearer the centre of the pupil than the pupillary margin of the squinting eye—where there is, therefore, a squint of 5–6°. In such cases an operation is generally not indicated. The second group includes the cases in which the corneal reflex is seen at the edge of the pupil of medium width, corresponding to a strabismus of about 12–15°. In such cases the simple division of the muscle is indicated. In the third group the corneal reflex appears beyond the margin of the pupil of medium width, corresponding to a strabismus of about 25°. In such cases the division of the shortened muscle and the moderate advancement of its antagonist are indicated. In the fourth group the corneal reflex appears at or near the corneal margin, corresponding to a strabismus of 45–50°. There must be a decided advancement in such cases, followed, if necessary, by division of the corresponding muscle of the other eye. The fifth group includes all the higher degrees of strabismus, 60–80°. In such cases the combined operation should be done on both eyes. The author performed 84 operations in 1885, according to the rules herein laid down, 37 of them being simple divisions, and 47 divisions combined with advancement.

According to Javal (105) muscular insufficiency exists only as the result of an erroneous diagnosis, as it completely disappears when the refraction is properly corrected. Marckwort.

Landolt (107) discusses tenotomy in muscular insufficiency.

Pierd'houy (110) discusses the indications for advancement, and describes a few small changes which he introduced into the technique of the operation. Dantone.

The best period of life for operation Roosa (111) thinks to be from the fifth to the seventh year. As regards the improvement in vision after the operation he has found it considerable, and thinks it due, when present, not to the operation, but to the letting up of the spasm of accommodation. This opinion is founded upon a table of 168 tenotomies for convergent strabismus which accompanies the paper. He therefore is no believer in amblyopia ex anopsia. BURNETT.

113. BERRY, G. A. On bilateral abducens paralysis. *Ophth. Rev.*, vol. v., No. 52, p. 33.

114. BLANC, E. Étude sur le diagnostic du siège des lésions dans les paralysies oculomotrices. *Arch. d'ophth.*, vol. vi., 3, p. 243.

115. EMERSON, J. B. Statistics illustrating the etiology of paralysis of the ocular muscles. *N. Y. Med. Jour.*, 1886, p. 520.

116. GALEZOWSKI. Des paralysies des nerfs moteurs de l'œil et de leur traitement par le bromhydrate de pelletièrine. *Rec. d'ophth.*, 1886, No. 3, p. 141.

117. LUCANUS. Ophthalmoplegia externa congenita. *Zehender's klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 271.

118. PARINAUD et MARIE. Névralgie et paralysie oculaire à retour périodique constituant un syndrome clinique special. *Arch. de névrologie*, Jan. 15, 1886.

119. RAMPOLDI. Due casi di affezione dolorosa del 5° paio guariti radicalmente collo strappo cruento del nervo. *Ann. di ottalm.*, vol. xiv., 5–6.

120. RAMPOLDI. Un nuovo caso di congenito squilibrio motorio oculo-palpebrale. *Ann. di ottalm.*, vol. xv., 1, p. 54.

121. REMAK, B. One hundred cases of post-diphtheritic paralysis of ocular muscles. *Centralbl. f. prakt. Augenhk.*, 1886, p. 161.

122. ROSENMEYER. On diphtheritic disturbances of vision. *Wiener med. Wochenschr.*, 1886, No. 13.

123. STRÜMPELL, A. On a case of progressive ophthalmoplegia. *Neurol. Centralbl.*, 1886, No. 2.

124. SUCKLING. Ophthalmoplegia. *Brit. Med. Jour.*, 1886, No. 1326, p. 245.

125. WALDMAN, P. B. Ophthalmoplegia externa. *Amer. Jour. Ophth.*, 1886, No. 4.

126. WERNER, L. Diplopia in paralysis of the superior and inferior recti and obliqui muscles. *Ophth. Rec.*, vol. v., No. 53, p. 65.

BERRY (113) found that while the ordinary convergent strabismus does not develop before the second or third year, paralytic convergent strabismus is observed in the first months. The paralysis is seldom complete, and generally of peripheric origin. He reports three cases.

BLANC (114) treats in a lucid manner the subject of localizing paralysis of the ocular muscles. He divides them into orbital, basilar, intrapeduncular, nuclear, and cerebral paralyses. On the basis of the anatomical arrangement of the ocular muscles, and their relations to other nerves, and keeping in view the results of experimental physiology and clinical observation, the author describes different forms of paralysis, and shows how it is possible to localize an affected area from the combination of the absence of single symptoms or whole groups, either on the part of the ocular muscles alone, or in combination with disturbances in other nervous departments. v. MITTELSTADT.

EMERSON (115) found among 36 pareses of the third nerve, 27.7 % giving a history of syphilis ; among 23 of the sixth nerve, 76 % of syphilitic origin ; 3 of the fourth nerve were due to syphilis, and 2 cases of ophthalmoplegia externa. BURNETT.

GALEZOWSKI (116) cured cases of ocular paralysis with hydrobromate of pelletièrine (1:120, one tablespoonful every 4–5 hours). Five clinical histories. The remedy failed in paralysis of the ciliary muscle and in paralysis due to tabes. MARCKWORT.

LUCANUS (117) observed congenital paralysis of both external recti in an otherwise healthy girl nine years old. The internal and superior recti, the inferior oblique, and levator palpebrarum were also paralyzed, but the inferior rectus, superior oblique, sphincter iridis, and tensor choroideæ were not affected.

PARINAUD (118) reports the case of a woman, aged twenty-six, who suffers every spring, since about her sixth year, from orbital neuralgia and temporary paralysis of the ocular muscles. The attacks increase in intensity for five or six days, continue at the same height for a week, and then gradually diminish and disappear, only to return after two months. MARCKWORT.

RAMPOLDI (119) tore the infratrochlearis with good results in a case of severe neuralgia, due to a cicatrix near the inner canthus. The detachment of the scar was twice performed, and was followed by an annoying nervous moaning which lasted for more than two months, but the neuralgia did not return. In another case of severe infraorbital pains the tearing of the nerve effected an instantaneous and permanent cure.

RAMPOLDI (120) describes a congenital disturbance of motility in the territory of the oculomotor nerve, observed in the left eye of a boy, aged seven. Ordinarily the upper lids sink down and the eye is turned outwards, but from time to time twitchings of the inactive muscles are observed, which can increase to such an extent as to completely open and straighten the eye. The pupil is somewhat dilated, and becomes smaller when efforts are made to bring the eye into the proper position. The eye can be rotated upwards only with difficulty, but its function is not affected.

DANTONE.

REMAK (121) and ROSENMEYER (122) report cases of paresis of accommodation after diphtheria. The sphincter of the iris was never affected, neither was optic neuritis found in any case.

STRÜMPELL (123) describes a case of binocular progressive ophthalmoplegia, which had been gradually developing for twenty-five years, but which for several years has remained stationary. There was ptosis in both eyes, the eyeballs were almost immovable, the pupils of medium width and responsive to light, the accommodation was paralyzed, but there was no diplopia. Every thing else was normal.

SUCKLING (124) reports almost complete paralysis of both oculomotor and of the abducens nerves in a man, aged sixty-seven, after a cold. The accommodation was not affected. In other respects the eyes were normal. Recovery after the use of iodide of potash.

WALDMAN (125) saw paralysis of the third nerve, supplying the exterior muscles of the eye, come on in one night. Under hypodermic injections of strychnine, increasing from $\frac{1}{40}$ to $\frac{1}{6}$ gr., a perfect recovery took place. (Insufficient report.) BURNETT.

X.—ORBIT AND NEIGHBORING CAVITIES.

127. BERGER, E., and TYRMAN, J. The diseases of the sphenoid cavity and of the labyrinth of the ethmoid bone, and their relations to affections of the eye. Wiesbaden, 1886 : J. F. Bergmann.

128. DEEREN. Exophthalmie double due à une myélite aiguë circonscrite. *Rec. d'ophth.*, 1886, No. 6, p. 337.

129. DELENS, E. Observation de tumeurs lymphadéniques des deux orbites. *Arch. d'ophth.*, vol. vi., 2, p. 154.

130. DOLSCHENKOW. Tumor cavernosus orbitæ sinistræ. *Wjestnik ophth.*, vol. iii., 1, p. 34.

131. Drake-Brockmann, E. F. Two cases of retro-ocular tumor. *Ophth. Rev.*, vol. v., No. 51, p. 8.

132. Gayet. Sur les tumeurs symmétriques des deux orbites et leur caractère symptomatique. *Arch. d'ophth.*, 1886, vol. vi., 1, p. 15.

133. Hirschberg, J., and Birnbacher, A. A case of rapidly growing malignant sarcoma of the orbit. *Centralbl. f. prakt. Augenhk.*, 1886, p. 65.

134. MacBurney. Orbital aneurism. *N. Y. Med. Journ.*, vol. xliii., No. 12, p. 133.

135. Motais. Un cas remarquable d' exophthalmos. *Ann. d'ocul.*, vol. xcv., p. 47.

136. de Vincentiis. Una seconda osservazione di mucocele o di ectasia del labirinto etmoidale, con operazione radicale. *Riv. internaz. di Med. e Chir.*, vol. iii., 2, p. 69.

Berger and Tyrman (127) have compiled the published cases of affections of the sphenoid cavity and of the labyrinth of the ethmoid bone in which an autopsy was made, and examined them in regard to their connection with affections of the eye. They found that as long as the inflammation or neoplasm is confined to the sphenoid cavity, there are either no subjective symptoms, or there is severe headache, occasionally of an intermittent character. When the surrounding tissues become affected, symptoms manifest themselves which point to the sphenoid bone as the seat of the affection. Caries and necrosis of the body of the sphenoid bone may produce sudden unilateral blindness combined with orbital phlegmon, but also gradual discharge of portions of the bone unattended by any visual disturbances, and followed finally by meningitis. Sometimes portions of the body of the sphenoid bone are suddenly discharged through the nose, fatal hemorrhages occur after perforation of the bony wall between the cavernous sinus and the sphenoid cavity, retropharyngeal abscesses, thrombosis of the sinus with thrombosis of the ophthalmic artery, due to thrombosis of the sinus circularis sellæ turcicæ, and perforation of the base of the body of the sphenoid bone without any symptoms. Tumors of the body of the sphenoid bone may produce amaurosis by compression of the optic nerve in the optic canal. The tumor may spread to the neighboring cavities—the orbit, the nasopharynx, the labyrinth of the ethmoid bone, and to the cranial cavity,—causing meningitis. In the bibliography twenty-three cases are recorded in which amaurosis followed affections of the sphenoid bone in form of papillitis or atrophy of the optic nerve. After injuries of the body of the sphenoid bone dripping of the cerebro-spinal liquid, pulsating exophthalmus, amaurosis, and anæsthesia of the second and third branches of the fifth nerve have been observed. Inflammation of the labyrinth of the ethmoid bone may be followed by an orbital abscess and meningitis; caries also by an orbital abscess, orbital emphysema, discharge of portions of the ethmoid bone, and by meningitis; tumors of the labyrinth of the ethmoid bone give rise to the same symptoms as tumors which spring from the inner surface of the orbit. (This excellent monograph of 110 pages deserves to be read by every physician who pays attention to diseases of the head, eye, and nose.—K.)

DELENS (129) observed recovery from symmetrical orbital tumors in a man aged fifty-five, after he had been attacked by cholera. Tumors similar to those of the orbit were found in the hard palate, also swelling of the lymphatic glands in various parts of the body, and a marked increase of leucocytes. The spleen was not enlarged. In the very first days of the cholera a decided decrease of the orbital tumors was perceptible, and in two weeks they had entirely disappeared; also the neoplasms in the hard palate. The swelling of the glands was also much diminished.

V. MITTELSTÄDT.

DOLSCHENKOW (130) reports a case of cavernous tumor of the orbit. Patient twenty-one years old, perfectly healthy. In the upright position the left eye protrudes 8–9 *mm* in comparison with the right. $V = \frac{18}{15}$. Normal fundus, normal mobility. In the supine position the eye protrudes less, except when the internal jugular vein is compressed. When this vein is compressed in the upright position, the eyeball protrudes *ad maximum*; also when the breath is held. A slight blowing sound can be heard in the globe only when the breath is held. When the eyeball protrudes very much, vision becomes dim, and the patient feels pain and oppression. The left eye was said to have been injured fourteen years ago by a fall. The exophthalmus was first noticed seven years ago. Three years ago, during an attack of coughing, the eyeball first was dislocated. The author thinks the injury gave rise to the development of a cavernous tumor in the retrobulbar fatty tissue which surrounds the optic nerve within the pyramid of muscles.

HIRSCHMANN.

Drake-Brockmann (131) reports two cases of retrobulbar tumor. The first was observed in the left eye of a man aged twenty-five. There was marked proptosis, due to a somewhat elastic tumor at the inner edge of the orbit. As syphilis was probably the cause, he improved under the application of inunctions. The second case was that of a child aged five, whose blind left eye had been protruding since birth. After enucleation a tumor 2″ long was found springing from the optic nerve, which ended about ⅓‴ from the entrance of the optic nerve into the globe. It proved to be a fibroma.

In a man aged seventy Gayet (132) observed exophthalmus, which first showed itself in the right eye two years ago, and in the left four months ago; in the latter eye it was much more marked. The left eye is pushed downwards, forwards, and outwards by a tumor the size of a small apple directly beneath the upper lid. It is worthy of note that at times the tumor greatly decreased in size, and once even seemed to disappear entirely. Both eyes are immovable. V good; no changes in fundus. The patient suddenly became ill, and died in two days. As death was attributed to double pleurisy, the other organs were not examined. The following condition was found in the orbits: The tumor, which proved to be a lymphadenoma, filled the whole upper part of the orbit, and extended from the optic foramen to the upper lid, surrounded the posterior part of the globe, extended to the optic nerve, leaving its sheath intact, and then extended inwards and outwards towards the floor of the orbit, affecting the nerves, muscles, and blood-vessels. For details see the original. The author thinks the neoplasm originated in the fatty tissue, and assumes a previous œdematous condition of the connective tissue, which would also explain the variations in size of the tumor of the left side. He adds his case to the analogous ones of O. Becker, Leber, Osterwald, and Reymond, and regrets that during life the blood, and at the autopsy the other organs, were not examined. Leucæmic changes would probably have been found in this case also, which must always be thought of in symmetrical orbital tumors. v. Mittelstädt.

Hirschberg and Birnbacher (133) report a case of complete exenteration of the orbit in a girl aged eight, on account of a retro-ocular sarcoma. A relapse occurred a few months later, metastatic tumors developed, and the child died.

Motais (135) reports a case of exophthalmus which has not been quite satisfactorily explained. A woman, forty-three years old, after a slight illness of two or three weeks, was attacked with severe headache and fever on July 21st, and remained unconscious for twenty-four hours. When she recovered consciousness, so high a degree of exophthalmus of the right eye was discovered, that complete dislocation of the globe followed the separation of the lids. The cerebral symptoms had entirely disappeared. Neuro-retinitis developed in the hitherto healthy left eye on August 15th and 16th. On September 3d the patient had an attack similar to that of July 21st; unconsciousness, however, lasted for only two hours, and was followed by exophthalmus of the left eye instead of the right. The exophthalmus gradually disappeared, and was succeeded by atrophy of the optic nerve of the left eye. Since then four years have passed without an attack.

MARCKWORT.

137. ALT, A. Eight enucleations of panophthalmitic eyeballs. No antisepsis. No panophthalmitis. *Amer. Jour. Ophth.*, June, 1886.

138. DOR. Les cas de mort après énucléation. *Soc. franç. d'ophth.*, April 27, 1886.

139. HOBBY, C. M. Enucleation in panophthalmitis with a fatal case. *Amer. Jour. Ophth.*, 1886, vol. iii., No. 6, p. 141.

140. NETTLESHIP. Meningitis after enucleation. *Ophth. Soc. Unit. Kingd.*, Jan. 28, 1886.

141. DE WECKER, L. L'antisepsie comme moyen preventif des dangers de mort après les opérations orbitaires. *Ann. d'ocul.*, vol. xcv., p. 55.

ALT (137) thinks the danger from enucleation of eyes suffering from panophthalmitis is greatly overrated. BURNETT.

DOR (138) saw death in two cases after enucleation. In the first case the meningitis had developed in a tuberculous patient six weeks after the operation. In the other case the patient was well five days after the enucleation, and died of embolism, or apoplexy, or sublimate-poisoning, in two days. In view of the circumstance Gayet asks whether there was any direct connection. Chevallereau reports the case of a boy aged nine, who, six weeks after the enucleation, was attacked with meningitis. He also was tuberculous. Dransart never saw death follow enucleation. Galezowski only twice among the large number he has made.

MARCKWORT.

Hobby (139) reports a case in which the panophthalmitis was due to injury from a stone. On the fourth day after the enucleation there was death preceded by delirium and coma (meningitis). No post-mortem. Burnett.

Nettleship (140) has compiled twenty-eight cases in which death from purulent meningitis followed enucleation. In eighteen an autopsy was made, which confirmed the diagnosis in every case. He seeks the cause in infection of the wound, and believes that free drainage of the orbit can prevent such a result.

Referring to Deutschmann's paper "On purulent meningitis after enucleation" (*cf. Arch. f. Ophth.*, vol. xxxi., p. 251), Wecker (141) calls attention to the urgent necessity of thorough disinfection in operations in the orbit. Aside from the disinfection of the instruments, etc., the silk thread used for suturing the conjunctiva is placed for twenty-four hours in a mixture of glycerine, alcohol, and salicylic acid, and then for some time in a sublimate solution (1 : 2500). This solution is also brushed into the eye, not only before the application of the thread, but also before and after tying it. No suture, however, is applied in enucleation of an eye affected with hemorrhagic glaucoma, on account of the secondary hemorrhage which frequently occurs. Wecker recommends exenteration of the globe. Marckwort.

142. Hack. The operative treatment of Basedow's disease. *Deutsche med Wochenschr.*, 1886, No. 25.

143. Maher, W. O. Morbus Basedowii. *Ophth. Soc. Unit. Kingd.*, June 8, 1886.

144. Waehner, C. Contribution to the pathological anatomy of Basedow's disease. Berlin and Neuwied, 1886.

145. Wild, Robert. Exophthalmic goitre : family predisposition. *Brit. Med. Journ.*, 1886, vol. i., p. 1021.

In a girl aged 17, Hack (142) saw exophthalmus develop combined with enlargement of the left lobe of the thyroid gland. She also complained of darting pains in the region of the heart and of palpitations in every direction. Graefe's symptom was also observed. The patient had come to be treated on account of marked obturation of the nose. Hack found hyperplasia of high degree in the erectile tissue of the middle and lower turbinated bodies of both sides. After cauterizing the erectile tissue the exophthalmus almost entirely disappeared. Improvement continued, the palpitations ceased, and the thyroid gland decreased in size. A few months later the heart was found normal in every respect.

Maher (143) saw the disease in a man aged 34. Both the exophthalmus and the goitre were confined to the right side.

Wild (145) reports that four members of a family, the mother and three daughters, were affected with morbus Basedowii.

XI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

146. Alt, A. An epidemic of trachoma among the children of an orphan asylum. *Amer. Journ. Ophth.*, vol. iii., 2, p. 23.

147. Armaignac. Note sur un cas de conjonctivite blennorrhagique séro-vasculaire bénigne spontanée. *Rev. clin. d'ocul.*, 1886, No. 1, p. 1.

148. Armaignac. Sur les nævi de l'œil et des parties voisines. *Rev. clin. d'ocul.*, 1886, Nos. 3 and 4, pp. 73 and 97.

149. Bögel, G. The subconjunctival lipoma and its combination with ichthyosis hystrix. *Graefe's Arch. f. Ophth.*, vol. xxxii., 1, p. 129.

150. Brailey, W. Essential shrinking of the conjunctiva. *Ophth. Soc. Unit. Kingd.*, Jan. 28, 1886.

151. Burchardt. On diphtheritic conjunctivitis. *Charité Ann.*, 1886.

152. Critchett and Juler. Essential shrinking of the conjunctiva. *Ophth. Soc. Unit. Kingd.*, Jan. 28, 1886.

153. Darrier. Traitement de la conjonctivite granuleuse. *Soc. franç. d'ophth.*, 1886, April 29th.

154. Derby, R. H. Contagious eye-troubles in asylums in New York and vicinity. *N. Y. Med. Journ.*, vol. xliii., No. 6.

155. Fieuzal. Des cautérisations au jus de citron. *Bull. de la clin. nat. ophth.*, vol. vi., No. 2, p. 57.

156. Fuchs, E. Tuberculosis of the conjunctiva. *Wiener med. Presse*, 1886, No. 15.

157. Gifford, H. The occurrence of micro-organisms in conjunctivitis eczematosa and other conditions of the conjunctiva and cornea. These Arch., vol. xv., p. 180.

158. Gradle, A. Certain periodic affections of the conjunctiva allied to hay-fever. *Amer. Journ. Med. Sci.*, April, 1886.

159. Groiscz, B. Panophthalmitis due to an operation for pterygium. *Szemeszet*, 1886, No. 1.

160. Kaltenbach. The prophylaxis of ophthalmo-blennorrhœa neonatorum. *Münchener med. Wochenschr.*, 1886, No. 26.

161. KAMOCKI. Contribution to the knowledge of the hyaline inflammation of the conjunctiva. *Centralbl. f. prakt. Augenhk.*, 1886, p. 68.

162. LESCYNSKY, W. M. Leucorrhœa as the cause of a recent epidemic of purulent ophthalmia in one of our city charitable institutions. *N. Y. Med. Journ.*, vol. xliii., No. 13, p. 352.

163. MARTIN. Note sur un cas de conjonctivite rhumatismale. *Journ. des sci. méd. de Lille*, Jan. 2, 1886.

164. MICHEL. The micro-organism of the so-called Egyptian ophthalmia. These ARCHIV., vol. xv., p. 452.

165. RAMPOLDI. Granuloma ulcerato o ulcera tubercolare della congiuntiva. *Ann. di ottalm.*, vol. xv., 1, p. 60.

166. RHEIN, P. On primary tuberculosis of the conjunctiva. *Münchener med. Wochenschr.*, 1886, Nos. 13 and 14.

167. SMITH, G. M. Contagious eye-diseases in public institutions. *N. Y. Med. Journ.*, vol. xliii., No. 6.

168. TROUSSEAU, A. La conjonctivite blennorrhagique spontanée sans inoculation. *Rev. clin. d'ocul.*, 1886, No. 3, p. 61.

169. TROUSSEAU. La conjonctivite chrysophanique. *Rev. clin. d'ocul.*, 1886, No. 5, p. 105.

170. DE WECKER. Un dernier mot sur le jequirity. *Rev. clin. d'ocul.*, 1886, No. 4, p. 87.

171. WESTHOFF. Trachoom-Behandeling. *Weekblad van het Nederl. Tijdschrift voor Geneesk.*, 1886, p. 549.

172. WOLFRING. Report on the pathologico-anatomical changes in the contagious inflammation of the conjunctiva. *Wjestnik ophth.*, vol. iii., 1, p. 78.

173. ZIEM. The simultaneous occurrence of trachoma and of catarrhs of the nasal mucous membrane. *Allg. med. Centralztg.*, 1886, Nos. 20 and 23.

ALT (146) reports that, of the sixty-three children in the institution, forty-three had trachoma, which could be directly traced to a case of the disease which had been admitted some seven months before. They were treated with sulphate of copper, yellow oxide of mercury, and atropine, when needed, with almost uniformly good results. BURNETT.

ARMAIGNAC (147) reports a case of benign conjunctivitis as it occurs in gonorrhœa and especially in rheumatism of the joints caused by the latter. In Armaignac's case, goutte militaire had existed for twenty years without any affection of the joints. According to Fournier (*cf. Gaz. des hôp.*, 1885), this form of conjunctivitis is almost pathognomonic of the disease in question. It is marked by serous chemosis and vascularization of the whole conjunctiva; sometimes only the palpebral or ocular conjunctiva is affected. The absence of the symptoms usually attending conjunctivitis is peculiar; lachrymation, photophobia, pain, etc. The course is favorable, the treatment expectant, at least very mild. To prevent it the gonorrhœa must be treated.

V. MITTELSTÄDT.

In a case observed by ARMAIGNAC (148) there was a tumor at the upper outer part of the conjunctiva. There was no appreciable change in six years. In another case there was a vascular nævus on the conjunctiva near the caruncle. Removal; recovery.

V. MITTELSTÄDT.

After describing two cases of subconjunctival lipoma, which were removed and were remarkable on account of the hyperplasia of the fat and glands, BÖGEL (149) calls such tumors teratoid tumors, and divides them into two groups—those which appear in the usual form of dermoids, and those which, besides epithelial and cuticular connective tissue, contain hyperplastic masses of fat, interspersed with nerves and glands.

BRAILEY (150) describes a case of essential shrinking of the conjunctiva greatly resembling pemphigus, though the existence of the latter could not be shown.

BURCHARDT (151) observed in 1884 and 1885 twelve cases of diphtheria of the throat and lids. Sharply defined white masses spreading over the surface of the conjunctiva were found near the edges of the lids, and extended deep into the epithelium. The lids were frequently only slightly swollen; they were never stiff. Of the twelve patients four died of diphtheria of other parts. No scars remained in any case; in five cases corneal ulcers developed after the children had recovered, in four of which the ulcers did not perforate. This complication occurred in three of the four that died. The conjunctival affection was treated with applications of sublimate (1:1000), the corneal ulcers with the galvano-cautery.

CRITCHETT and JULER (152) also report two cases of essential shrinking of the conjunctiva.

In trachoma DARRIER (153) recommends the alternate application of chromic acid and sulphate of copper. Galezowski reports that Richet used chromic acid in 1868, but gave it up on account of the deep scars it produced. Warlomont shows that chromic acid was used for this purpose as early as 1858. (Hairion: De l'emploi de l'acide chromique dans certains cas déterminés de l'ophthalmie granuleuse. *Ann. d'ocul.*, vol. xxxix., p. 213.) Sédan and Galezowski recommend excision of the fornix. Chibret and Poncet call attention to the fact that the disease differs in different countries. Wicherkiewicz cauterizes every three or four days with sublimate (1:100). Dehenne treats almost all his patients with the thermo-cautery. (It is worthy of note that, in contrast with the proceedings of former years, nobody at the French Ophthalmological Congress recommended jequirity this year.—Rev.) MARCKWORT.

DERBY (154) reports that in St. Patrick's Orphan Asylum in New York 203 among 409 girls suffered with contagious ocular affections, among 357 boys 105, in the Deborah Educational Institute 50 children among 223; in the St. Joseph's Home 22 % had chronic blennorrhœa; in the Nursery and Children's Hospital 178 among 461 had ocular affections, in the Mission of the Immaculate Virgin 127 among 372 boys, in the Catholic Protectory 871 among 2,137 boys, etc. The cause lay in the fact that the children affected with eye-troubles were not separated from the rest.

In pseudo-membranous or true diphtheritic conjunctivitis FIEUZAL (155) recommends the simultaneous application of lemon-juice and nitrate of silver in the following manner: A brush dipped in lemon-juice just pressed out is passed over the spots covered with the false or true diphtheritic membranes. A few minutes later Fieuzal washes the conjunctiva with lukewarm water, and then with the same brush, now dipped into a 2 % solution of nitrate of silver, touches the spots thus far not affected. Teillais washes with lemon-juice and covers the conjunctiva with iodoform. Galezowski uses oleum cadini (1:10). Manolescu saw paralysis of the right arm after true diphtheritic conjunctivitis. Poncet attaches most importance to frequent cleansing. Juler uses an ointment of yellow precipitate in such cases. MARCKWORT.

FUCHS (156) found in the lower fornix of a boy, aged ten, granualtions and small tumors in the tarsal portion, in which tubercle bacilli were found.

In conjunctivitis eczematosa GIFFORD (157) found seven different kinds of microbes, four of which proved pathogenic. He never succeeded, however, in producing phlyctenulæ by introducing the microbes into the conjunctival sac of the rabbits.

Gradle (158) describes in full four cases of periodic disease of the conjunctiva allied to hay-fever. It would appear from a description of the appearances and symptoms that they were cases of spring catarrh without the marked circumcorneal changes which are usually met with. Such instances are reported by Vetch, and are not infrequent. Burnett.

Kaltenbach (160) no longer uses Credé's method to prevent blennorrhœa neonatorum. During labor he washes out the vagina frequently with a sublimate solution, and after the child has been born simply washes the eyes with distilled water. In this manner he has obtained equally good results as with Credé's method. Its advantage lies in its simplicity and the absence of irritation, artificial conjunctivitis being avoided.

Kamocki (161) examined pieces of conjunctiva affected with hyaline degeneration, and reports the results.

Martin (163) relates the case of a woman who during an attack of acute rheumatism of the joints became affected with acute conjunctivitis accompanied by marked chemosis, at first in the right eye, afterwards in the left. She was treated with hot applications and salicylate of soda given internally, and recovered in a month. Marckwort.

In a young man, who soon afterwards died of tuberculosis, Rampoldi (165) operated upon an extensive ulcer of the conjunctiva of the upper lid, which everybody would have considered tuberculous. Nevertheless the microscope proved it to be a granuloma, without a trace of giant cells or tubercle bacilli. Dantone.

Rhein (166) observed four cases of tuberculosis of the conjunctiva in girls between the ages of fourteen and twenty. The palpebral conjunctiva was covered with a large number of grayish-yellow nodules. There he also found ulcers with a lardaceous floor. None of the girls had general tuberculosis ; in one the nasal mucous membrane and skin were affected. The introduction of the nodules into the anterior chamber of rabbits' eyes caused tuberculosis of the iris, in some of the animals also tuberculosis of the lungs.

Trousseau (168) also agrees with Haltenhoff and Fournier, that there is a conjunctivitis characteristic of gonorrhœa, and reports a similar case to that of Armaignac. v. Mittelstädt.

Trousseau (169) saw a peculiar kind of conjunctivitis in patients who had been treated for psoriasis with chrysophanic acid; from 4 to 5 per cent. of the patients treated were thus affected in from twelve to twenty-four hours after the application.

MARCKWORT.

DE WECKER (170) desires to leave the decision as to the value of the jequirity treatment to others who have a larger number of trachoma cases under their care, as he has attained his aim—the substitution of jequirity for inoculation with blennorrhoic pus.

v. MITTELSTÄDT.

WESTHOFF (171) did not succeed in cultivating the trachoma-coccus either on meat peptone-gelatine or on meat peptone-agar-agar. In treating trachoma he instilled a 5 % solution of cocaine, and brushed the lids with a solution of nitrate of silver, with sulphate of copper and crude alum.

WOLFRING (172) believes the main cause of the acute infectious catarrh to be swelling of the acino-tubular glands and their surroundings.

ZIEM (173) thinks that affections of the conjunctiva are frequently due to nasal troubles. Retention of the tears causes catarrh of the lids, making the diseased conjunctiva more susceptible to the contagium of trachoma suspended in the air (?—Rev.) than the healthy conjunctiva.

174. AYRES, S. C. Incrustation of lime on the cornea. *Amer. Journ. Ophth.*, 1886, No. 1.

175. BERRY, T. A. On the non-operative treatment of serpiginous hypopyon corneal ulcer. *Ophth. Rev.*, 1886, No. 58, p. 357.

176. DANTZIGER, C. The treatment of corneal opacities by massage of the eye. *Deutsche Medicinalztg.*, 1886, No. 7.

177. DOLSCHENKOW. Keratitis superficialisa vasculosa. *Wjestnik ophthalm.*, 1886, No. 2, p. 123.

178. EVERSBUSCH, O. The application of the thermo-cautery in destructive corneal processes. *Zehender's klin. Monatsbl. f. Augenhk.*, xxiv., p. 88.

179. GALEZOWSKI. Du traitement du staphylome conique de la cornée par l'excision d'un lambeau sémilunaire de la cornée. *Rec. d'ophth.*, 1886, No. 6; *Gaz. des hôp.*, 1886, No. 69.

180. GRADENIGO. Lettera aperta al Chiari. Dr. Rosmini. *Boll. d'ocul.*, vol. viii., 10.

181. HUBERT. Des taches de la cornée et leur traitement. *Soc. franç. d'ophth.*, April 28, 1886.

182. INOUYE. De la sclérotomie modifiée dans le cas de sta-

phylome naissant de la cornée avec prolapsus persistant de l'iris. *Rev. gén. d'ophth.*, 1886, p. 97.

183. PONCET. Sur les granulations de la cornée. *Soc. franç. d'ophth.*, Apr. 29, 1886.

184. RAMPOLDI. Ancora due casi di congestione linfatica oculare. *Ann. di ottalm.*, vol. xv., 1, p. 56.

185. ROLLAND. Kératite sympathique consécutive à la destruction d'un œil par traumatisme chez un individu vigoureux et sans diathèse. *Rec. d'ophth.*, 1886, No. 3, p. 137.

186. THOMPSON, J. W. Corneal ulcers. *Journ. Amer. Med. Assoc.*, June 19, 1886.

AYRES (174) observed incrustation of lime on the cornea. After its removal with the knife the cornea became entirely transparent. BURNETT.

DANTZIGER (176) recommends Heisrath's method of clearing up corneal opacities by massage. The treatment lasted for about two months, the patient being treated daily for about half a minute. In ten cases he had good results.

DOLSCHENKOW (177) observed protracted and frequently recurrent formation of nodules and vesicles in epithelium of the cornea, combined with scaling, and attended with severe, frequently returning pain. The disease lasted four years in the left eye, leaving a thin, superficial opacity. In the right eye the disease began six months after it had ceased in the left, and has already lasted two years and a half. Treatment utterly fails. Shortly before the disease began, the patient, at that time forty-two years old, had completely lost her menses after a wetting she received. The author thinks the disease is of a parasitic nature. (It seems to be a recurrent herpes ophthalmicus zoster.—Rev.) HIRSCHMANN.

In destructive corneal affections EVERSBUSCH (178) recommends the thermo-cautery devised by himself. He claims that it is preferable to the galvano-cautery, as it never fails to act.

In cases of staphyloma pellucidum GALEZOWSKI (179) recommends excision of a small semilunar horizontal flap over the visual axis; it should be 4–5 *mm* long, and in the middle 2–3 *mm* wide. After the operation eserine is instilled and a bandage applied, which is not removed for eight days. MARCKWORT.

GRADENIGO'S (180) method consists in making a crucial incision through the leucoma, and inserting a small glass tube, 7–8 *mm* long, into the opening thus made, the tube being attached to the concave surface of an artificial eye where the pupil is situated. The amount of sight obtained is sometimes remarkable, though of course it does not last for more than four or five days; in one case the patient could even read No. 2 of Wecker's test-types.

DANTONE.

In corneal opacities, cicatricial as well as sclerosed, HUBERT (181) recommends the application of bipolar electrolysis, and describes the instrument at length. Prouff has operated three times, according to Hubert's method, with very good success.

MARCKWORT.

INOUYE (182) performs a peculiar kind of sclerotomy in beginning extensive staphylomas of the cornea with prolapse of iris. Graefe's knife is passed into the cornea about one *mm* from the edge, as far as possible from the free place. The point of the knife is turned towards the ciliary body; the counter-puncture is made in the sclera one *mm* from the corneal margin, the section being made about 6 or 7 *mm* long and cutting the corneal margin under an angle of about 20°. The wound is opened twice daily until the cornea flattens. Afterwards an optical iridectomy follows. He reports four cases. MARCKWORT.

PONCET (183) made an anatomical examination of an eye which had been affected with granulations of the cornea; it had been enucleated by Dehenne, on account of severe complications. The micrococci were found not only in the cornea, but also in the iris and ciliary body. MARCKWORT.

RAMPOLDI (184) describes two more cases of lymphatic infiltration of the cornea, which came on when the head was inclined forwards for a few minutes, and disappeared under the eyes of the observer when the head was held erect again. DANTONE.

ROLLAND (185) reports a case of sympathetic keratitis: Infiltration of the whole cornea, especially of the lower inner quadrant, superficial ulceration, marked conjunctival injection. $V = \frac{1}{8}$. Recovery without any treatment in ten days after the exciting stump had been removed. MARCKWORT.

THOMPSON (186) thinks, from his experience, that the use of alum as an astringent in conjunctivitis leads to ulcerations of the cornea as a complication. BURNETT.

187. ADDARIO. Su di un caso di melano-sarcoma espisclerale e sulla formazione della melanina ne' tumori. *Ann. di ottalm.* vol. xiv., 5, 6.

ADDARIO (187) describes a melano-sarcoma which, springing from the episcleral tissue of the left eye, had produced metastases in most organs of the body. DANTONE.

188. GUAITA. Di alcune inesplorate virtu terapeutiche della cocaina in ottalmojatrica. *Ann. di ottalm.*, vol. xiv., 5, 6.

189. PFLÜGER. Pathological and physiological action of cocaine, movement of the iris, mydriatic action of atropine. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 169.

890. SCHUBERT. A case of cocaine-intoxication. *Centralbl. f. prakt. Augenhk.*, 1886, p. 17.

191. WILLIAMS, R. Case of cysticercus in the anterior chamber. *Lancet*, 1886, vol i., p. 102.

192. WOOD-WHITE. Ill effects of cocaine. *Ophth. Rev.*, Jan., 1886, p. 6.

193. WÜRDINGER L. Experimental and anatomical investigations of the action of cocaine on the cornea. *Münchener med. Wochenschr.*, 1886, Nos. 8 and 9.

GUAITA (188) finds that in consequence of the relaxation of the recti muscles, which may be increased to hypotony, cocaine diminishes the probability of the escape of vitreous in cataract-extraction, and permits therefore the frequent introduction of instruments. For the same reason the remedy is recommended in squint-operations, especially in advancement or when too great an effect has been produced by simple division. As it diminishes the tension, it is indicated in glaucoma, and on account of its mydriatic and anæsthetic properties it should be used in connection with atropine in iritis, in irido-cyclitis, and in sympathetic ophthalmia, in inflammations of the conjunctiva and cornea accompanied with pain and photophobia, and in injuries and contusions of the globe. The author has never seen any of the evil results mentioned by other observers, except the slight exophthalmus and the retraction of the lids; the latter might interfere with the manœuvres with the lids in cataract-extraction. Both effects can be prevented, when the strength of the remedy and the number of instillations are not exaggerated. DANTONE.

PFLÜGER (189) describes two kinds of opacity of the cornea due to cocaine. One begins at the edge of the operative wound, spreads into the corneal tissue, and is harmless, disappearing in one or two weeks. It is probably due to a deposit produced by the cocaine in the lymph. The other is attended with long-continued diminished tension and anæsthesia of the cornea, vesicles continue to form with great persistence, and the cornea has but a slight tendency to clear up.

SCHUBERT (190) reports that the subcutaneous injection of six drops of a 20 % solution of cocaine for the removal of a carious tooth was followed by obscuration of vision and unconsciousness lasting for some time. Consciousness soon returned after inhalation of a few drops of nitrite of amyl, and vision also was restored.

WOOD-WHITE (192) attributes the corneal opacity after instilling cocaine to the sublimate used besides, and therefore proposes to substitute boracic acid for the latter.

For the purpose of studying the corneal changes which occur after the instillation of cocaine, WÜRDINGER (193) repeatedly used a 5 % solution on rabbits' eyes. One eye was kept closed, the other open. A loss of epithelium invariably developed in the latter, which, by continuing the experiment, constantly grew larger and led to complete haziness of the cornea. The greater action was not produced by stronger solutions or more frequent instillations, but by the longer duration of the experiment and the greater length of time during which the eye was kept open. The author found that the corneal changes are due to evaporation and lymphatic anæmia of the cornea. He recommends the application of a guttapercha-sublimate bandage, continued for several days, to cut short a beginning cocaine-keratitis. As a prophylactic measure, he advises to first cleanse the eye with sublimate, and then begin with the instillations of cocaine. After each instillation the lids must be tightly closed to keep out the influence of the air, and a moist bandage should be applied until it is time to begin the operation.

Sections XII.–XXI. reviewed by DR. NIEDEN.

Translation by A. SCHAPRINGER, M.D., New York.

XII.—IRIS.

194. MORANO. Dell' uveite. *Ann. di ottalm.*, vol. xv., p. 76.

195. LAWRENTJEFF (St. Petersburg). On congenital anomalies of the iris. *Centralbl. f. Augenh.*, Bd. ix., p. 10.

196. VAN DUYSE. Contribution à l'étude des membranes pupillaires persistantes. With wood-cuts. *Annales d'ocul.*, 49, vol. xcv., 1 et 2 livraisons, Janv.–Févr., 1886, p. 13.

MORANO (194) found posterior synechiæ in four individuals whose sight had only recently become affected, and in whom there were absolutely no symptoms of parenchymatous iritis or iridocyclitis, the inflammatory process having been confined to the pigmentary layer of the iris. M. calls this affection uveitis, and believes that it is produced by straining the accommodation in a sitting posture. DANTONE.

LAWRENTJEFF (195) describes a case of congenital total irideremia of both eyes, with stellate cataract and fœtal ring of the cornea, in a man aged thirty-eight years. The ciliary processes could not be seen. With a stenopæic slit S was $\frac{3}{100}$ and $\frac{10}{100}$. There was oscillatory nystagmus. L. has collected thirty analogous cases previously published, which show that the affection is often hereditary, sometimes reappearing in a number of generations. The lens was free from opacity in two cases only.

VAN DUYSE (196) describes four cases of persistent pupillary membrane, and discusses the different theories concerning its origin and the relation it bears to the iris. The details of the cases cannot be reproduced in this review. v. MITTELSTÄDT.

XIII.—CHOROID.

197. TANSLEY, J. O. A case of acute localized choroiditis. *Am. Jour. of Ophth.*, March, 1886.

198. WARE, LYMAN. Ossification of the choroid. *Jour. Amer. Med. Assoc.*, Jan. 9, 1886.

199. HÄNSELL, PAUL. Sarcome du corps ciliaire. *Bull. de la clin. ophth. des Quinze-vingts*, vol. iv., No. 2, Avril–Juin, 1886, p. 64.

200. MANZ. Case of metastatic cancer of choroid. *Von Graefe's Arch. f. Ophth.*, vol. xxxi., 4, p. 101.

TANSLEY (197) had an opportunity of watching the development and progress of a case of central choroiditis of an acute character. It passed away in the course of five weeks, leaving vision normal. BURNETT.

In WARE'S (198) case the eye was lost from inflammation due to an injury eighteen years before enucleation was made. The bone surrounded the optic-nerve entrance, and occupied the place of the choroid. The shell was 15 *mm* in length, 8 *mm* in width. BURNETT.

HÄNSELL (199) publishes a case of sarcoma of the ciliary body occurring in a woman forty-eight years of age. Sclerotomy had already been performed upon the eye by another practitioner on account of glaucomatous symptoms, and afterwards iridectomy by Fieuzal, whereupon the pain subsided. Three months later a nodule, the size of a grain of wheat, its surface resembling that of a raspberry, was discovered behind the coloboma. It grew rapidly, and necessitated enucleation. It was found that the sarcoma had originated in the connective tissue of the ciliary body. The cells of the sarcoma were derived partly from the cells of the pars ciliaris retinæ, thus proving that this structure belongs to the connective-tissue series, and partly from connective-tissue cells which had assumed embryonic forms. The latter cells were the result of genuine indirect segmentation which had taken place in the neighborhood of the blood-vessels, and probably in consequence of some irritation emanating from these vessels.

V. MITTELSTÄDT.

MANZ (200) describes a case of metastatic cancer of the choroid occurring in a woman fifty years of age, who suffered from a carcinoma of the left mammary gland. The choroid of the right eye became affected first, and afterwards also that of the other eye. Manz thinks that the affection travelled from one eye to the other by way of the optic nerves. There was no increase of tension.

To this paper of Manz, Leber adds a few remarks concerning the case of pigmented and very vascular nævus of the cheek, the extirpation of which was followed at the end of twelve months by the appearance of a malignant tumor of the choroid, which case was observed at the clinic of v. Graefe, in 1870. Leber refutes the objections of Fuchs, who does not recognize any connection between the nævus and the choroidal tumor, and quotes analogous cases observed by Schiess-Gemusens and Roth, in which the microscopic appearances also coincided with those found in the case of v. Graefe.

XIV.—GLAUCOMA.

201. CROSTI. Sulla natura del glaucoma primitivo. *Giorn. med. del R. Eserc. e della R. Marina*, vol. xxxiv., 6, p. 656.

202. RAMPOLDI. Casi di intermittente ipotonia oculare. *Gazz. med. ital. lomb.*, vol. xlvi., 12.

203. LAKER, E. Experiments concerning glaucomatous excavation. *Zehender's klin. Monatsbl.*, May, 1886, p. 187.

204. Hirschberg, J. On rainbow colors in glaucoma. *Deutsche med. Wochenschr.*, 1886, Nos. 3 and 4.

205. Lundy, C. J. Glaucoma following the sting of a bee. *Amer. Jour. Ophth.*, May, 1886.

206. Martin, Georges. Des variations dans le degré et le sens de l'astigmatisme cornéen chez les glaucomateux. *Soc. franç. d'ophth.*, 1886, April 27th ; *Ann. d'ocul.*, vol. xcv., p. 207.

207. Armaignac, H. Traitement du glaucome par les instillations simultanées de cocaine et d'esérine. Observations. *Revue clin. d'ocul.*, 7, A., No. 6, June, 1886, p. 29.

208. Richey, S. O. A case of chronic simple glaucoma treated with eserine. *Chicago Med. Jour. and Exam.*, Dec., 1885.

209. Panas. Dut traitement de certaines formes de glaucome sans opération. *France méd.*, 1886, p. 827.

210. Landesberg. The efficiency of sclerotomy in glaucoma. *v. Graefe's Arch. f. Ophth.*, Bd. xxxii., 1, p. 253.

211. Galezowski. Sur l' ophthalmotomie ou sclérochoriotomie postérieure. *Soc. franç. d'ophth.*, 1886, April 30th ; *Ann. d'ocul.*, vol. xcv., p. 231.

212. Masselon. Sur le glaucome. *Soc. franç. d'ophth.*, 1886 ; *Ann. d'ocul.*, vol. xcv., p. 231.

213. Landesberg. Contribution to the knowledge of glaucoma. *Centr. f. Aug.*, Bd. x., p. 109.

214. Javal. Dangers de la cocaine dans le glaucome. *Progr. méd.*, 1886, p. 355.

Crosti's (201) paper is an historical and critical essay on the theories concerning glaucoma which have been brought forward from the time of the invention of the ophthalmoscope up to the present date. He comes to the conclusion that the glaucomatous symptoms are caused by an irritation of the ciliary nerves causing spasmodic contraction of the arteries supplied by them.

Dantone.

Rampoldi (202) reports five cases of inflammation of the cornea and iris, in which he observed an abnormally low degree of intraocular tension. The patients, four children and a youth of nineteen, were all delicate. All the symptoms disappeared under the employment of atropia and a pressure bandage and did not leave a trace behind. R. cannot find a satisfactory explanation for this phenomenon.

Laker (203) increased the tension of eyeballs of corpses considerably by injections of a solution of chloride of sodium. The lamina cribrosa was afterwards found to have bulged out, beginning at the scleral ring, the same as in glaucomatous excavation.

Hirschberg (204) explains the rainbow colors seen in glaucoma by the diffraction of light caused by the slight haziness of the cornea. He proves his theory (1) by the spectral arrangement of the colored rings, (2) by the occasional appearance of a double spectrum, and (3) by the fact that the inner or blue zone, which is usually overlooked by the patients on account of its dimness, can be rendered very conspicuous by the employment of the electric light. This phenomenon may also be met with in glaucoma simplex, and occasionally even in the normal eye, if the pupil be very much distended. The periodic appearance of colored rings is characteristic for glaucoma, but must not be regarded as pathognomonic.

Lundy (205) found that the sting of the bee entered at the insertion of the external rectus of the R eye. Excessive pain followed for several days, and sight gradually failed. When examined at the end of a week T + 3, and all the signs of acute inflammatory glaucoma. The eye was finally enucleated.

Burnett.

According to Martin (206) the increase of tension in glaucoma changes the meridian of the corneal astigmatism. The degree of astigmatism increases and decreases in the same proportion as the degree of tension. In 45 % of all glaucomatous eyes M. found the direction of astigmatism to be the reverse of the typical one, whilst in eyes not affected with glaucoma only 1.3 % show an atypical direction of the meridian of astigmatism.

Marckwort.

Armaignac (207) saw very good results follow the combined application of cocaine and eserine in two cases of chronic glaucoma. He recommends the employment of this method in cases where the patients dread an operation and when the latter is not an urgent necessity. v. Mittelstädt.

Richey (208) reports the case of a woman of thirty-seven, who had absolute glaucoma in the L and a simple glaucoma with typical symptoms in the R. $V = \frac{20}{200}$. Under eserine ($\frac{1}{4}$ gr. to ℥ i) twice a day, and general tonic treatment, V was brought up to $\frac{20}{40}$. The V. F. still remained contracted. Burnett.

PANAS (209) reports four cases of glaucoma cured by the employment of myotic substances alone. According to Panas these substances are actually curative, and not only palliative, agents in certain forms of glaucoma, especially those cases which are not benefited by operative procedures. The applications must be continued for a considerable length of time.

MARCKWORT.

LANDESBERG (210) records his experience gained in ninety cases of glaucoma treated by sclerotomy, in many of which he was enabled to watch the result for a number of years. The results on the whole were favorable. There was complete success in different cases of simple, acute, and subacute glaucoma, as well as in acute exacerbation of absolute glaucoma.

GALEZOWSKI (211) also pronounces in favor of sclerochoriotomy which he performed in sixteen cases and with good results. He introduces a Graefe knife between the superior and the external rectus muscle at a distance of from 5 to 6 *mm* behind the ciliary circle, plunges it into the vitreous body, and carries the incision forward as far as the region of the ciliary circle. The wound is sutured with catgut. In buphthalmus Galezowski makes two such incisions parallel to each other, but without any sutures. MARCKWORT.

MASSELON (212) proposes posterior or equatorial sclerotomy for certain cases of glaucoma, and bases his proposition upon the following reasoning: In glaucoma there is hypersecretion. In many cases in which iridectomy is performed, the eye remains hard nevertheless, because the hypersecretion takes place in the vitreous chamber and the excess cannot be carried off on account of the communication between the vitreous and aqueous chambers being shut off by certain abnormal conditions. Hence it must appear a rational procedure to open the vitreous chamber. Guérin had already performed this operation successfully in the past century. In order to spare the vitreous body as much as possible the operation ought to be performed by making a puncture and counter-puncture with a Graefe knife between the external and the inferior rectus muscle in the ciliary region in such a way that the knife remains on the surface of the vitreous body. MARCKWORT.

LANDESBERG (213) publishes five cases in which he had performed iridectomy in one eye for glaucoma, and where the prodromic symptoms of glaucoma which had already made their appearance in the other eye, disappeared after the operation performed on the first and without the application of any drugs. The eyes not operated on remained well permanently. Landesberg's observations run contrary to general experience. His patients were in the fifties. The time they were under observation was five years. L. believes that the cure was effected by sympathetic action.

JAVAL (214) observed an attack of glaucoma after the instillation of cocaine in an eye, the existence of the disease in which had been doubtful before the instillation. The glaucoma attack yielded to eserine. MARCKWORT.

XV.—SYMPATHETIC OPHTHALMIA.

215. ALBINI, E. Nuove osservazioni di exenteratio bulbi. *Gazz. d. cliniche*, vol. xxiii., p. 18.

216. RAMPOLDI. Brevi considerazioni intorno ad un caso di ottalmia simpatica. *Ann. di ott.*, vol. xv., 1, p. 32.

217. GALEZOWSKI. De l'épilepsie ayec névrite optique guérie par l'énucléation d'un œil blessé. *Rev. d'ophth.*, June, 1886.

218. HOFFMANN, F. W. A case of sympathetic ophthalmia cured without enucleation. *Zehender's klin. Monatsb.*, April, 1886, p. 121.

219. GEPNER (Warsaw). A rare form of symp. ophth. *C. f. A.*, Bd. x., p. 138.

220. DIANOUX. Du traitement chirurgical de l'ophthalmie sympathique. *Soc. franç. d'ophth.*, 1886, April 27th ; *Ann. d'ocul.*, vol xcv., p. 200.

221. GUAITA. Exenterazione del globo oculare. Processo operativo. *Ann. di ott.*, vol. xiv., 5 and 6.

ALBINI (215) reports a new series of eight cases of exenteration performed by Reymond, six of which healed without any noticeable reaction, so that an artificial eye could be inserted at the end of from seven to eleven days. In the two remaining cases the operation was performed on account of panophthalmitis after severe injury, and the healing process took longer because the sclerotic sloughed, and there was considerable suppuration. This accident has never been observed before, and Albini thinks that it was due to the fact that the periocular connective tissue had been implicated in the panophthalmitic process. At the expiration of four weeks the orbita, being lined with conjunctiva, presented the same appearance as if enucleation had been performed.

DANTONE.

In the case of RAMPOLDI (216), sympathetic inflammation developed, whilst the eyeball primarily affected remained free from irritation. There had been an injury of the cornea, iris, and lens by the penetration of a point of a pair of scissors, the traumatic tract had been operated for, and the eye saw better than the one affected by sympathy. For this reason enucleation was not proposed, but instead of it iridectomy was performed upon both eyes. Although there was atrophic degeneration of the iris in both eyes, and the operation could only be carried out piecemeal, the visual power of the eye sympathetically affected improved considerably, and remained satisfactory during two months, the time during which the case was kept under observation. DANTONE.

GALEZOWSKI (217) describes a case of epilepsy and neuritis of the optic nerve of one eye, caused by the irritated stump of the other eye. A gentleman forty years of age had met with an injury of the right eye six years ago, for which abscission of the anterior half of the globe had been performed. During the course of the last six months he had had frequent epileptic seizures, and the sight of his left eye had failed. Galezowski found neuro-retinitis with venous congestion, perivascular infiltration, and hemorrhagic foci along the course of the retinal vessels. The stump of the right eyeball was sensitive to pressure. After its removal the epileptic attacks disappeared, and the sight of the left eye improved considerably. According to Galezowski, the sympathetic affection is caused by vaso-motor reflex. MARCKWORT.

HOFFMANN (218) describes a case of sympathetic ophthalmia cured without enucleation. A woman, æt. fifty-five, had one eye operated upon for cataract. The same eye was attacked afterwards by irido-cyclitis with hypopyon, for which iridotomy was performed without success. The other eye then became affected with serous iritis, which subsided temporarily, but relapsed repeatedly until it was finally conquered by iridectomy and mercurial inunctions. After the lapse of two years the operation for the extraction of cataract was performed upon this eye, after which S was $= \frac{1}{3}$.

GEPNER (219) reports a case of sympathetic ophthalmia which occurred in the case of a locksmith twenty-five years of age, who had carried a splinter of brass in the retina of one eye for three months. The splinter caused choroiditis of the same eye and sympathetic œdema of the optic nerve and the retina of the other eye, with considerable diminution of S. Enucleation of the globe first affected soon caused the permanent disappearance of these symptoms ; the retina, however, did not regain its transparency.

DIANOUX (220) recommends enervation for the prevention or cure of sympathetic ophthalmitis. Out of forty cases operated upon, ciliary pain persisted in one only. In several of these cases the sympathetic inflammation was fully developed at the time of the operation. Abadie prefers enucleation. De Wecker condemns enervation, but is as yet undecided as regards the question of enucleation, *vs.* evisceration. Juarez recommends enucleation for cases of pronounced sympathetic inflammation, but does not object to enervation in doubtful cases. Boucheron holds that enervation must be performed before the appearance of the first symptoms of sympathetic ophthalmia since the operation is never successful afterwards. Dransart has performed enervation in fourteen cases and with success, but has abandoned the method since Poncet demonstrated the reunion of the divided nerves. Galezowski and Coursserant are decided partisans of enucleation.

MARCKWORT.

GUAITA (221) performed evisceration, according to Alfred Graefe, in two cases. In both cases the pain lasted for one week. In one case the stump continued to suppurate for twenty days, and in the other for four weeks. In a third case Guaita changed the method of precedure by dividing the sclerotic at a distance of 4 *mm* behind the corneal margin behind the ciliary body, and evacuating the contents of the globe by means of a sponge instead of a spoon. In this case the pain ceased at the expiration of twenty-four hours. The wound which had been united by a purse-string suture, healed by first intention in six days, and without the formation of a single drop of pus. DANTONE.

XVI.—LENS.

222. DE WECKER. Etiologie de la cataracte. *Revue clin. d' ocul.*, 1885, 11 and 12.

223. MEYHÖFER. Etiology of cataract, especially in glass-blowers. *Zehender's klin. Monatsbl.*, Feb., 1886, p. 49.

224. AYRES, S. C. Cataracta pyramidalis. *Amer. Journ. of Ophth.*, Jan., 1886.

225. WARLOMONT. L'extraction de la cataracte, vingt-cinq années de son histoire. *Ann. d'ocul.*, 1886, Jan.–Feb., p. 5.

226. CHISOLM, J. J. The rational method of treating cataract patients to the exclusion of compresses, bandages, and dark rooms. *Amer. Journ. of Ophth.*, June, 1886.

227. LAWRENTJEW. A slight modification in the method of extracting cataracts. *Wjestnik ophth.*, March–April, 1886.

228. BETTREMIEUX. Étude sur l'extraction de la cataracte. (Suite.) *Arch. d' ophth.*, vol. vi., No. 3, May–June, 1886, p. 268.

229. BETTREMIEUX. Étude sur l'extraction de la cataracte, indications de l'iridectomie, et recherches sur l'antisepsie opératoire. *Thèse de Paris*, 1886.

230. GALEZOWSKI. Sur la plaie cornéenne dans l'extraction de la cataracte et sur les moyens de prévenir sa suppuration. *Soc. franç. d'ophth.*, 1886 ; *Ann. d'ocul.*, vol. xcv., p. 225.

231. DE WECKER. L'avenir de l'extraction linéaire et de l'extraction à lambeau. *Ann. d'ocul.*, vol. xcv., p. 245. (Claim of priority.)

232. DE WECKER. Injections et pansements à l'éserine et antisepsie oculaire. *Ann. d'ocul.*, vol. xcv., p. 121 and 236.

233. WICHERKIEWICZ. Sur l'irrigation des chambres de l'œil pour l'extraction de la cataracte. *Soc. franç. d'ophth.*, 1886, April 30th ; *Ann. d'ocul.*, vol. xcv., p. 224.

234. GAYET. De la kératokystitomie dans l'opération de la cataracte. *Soc. franç. d'ophth.*, April 30, 1886 ; *Ann. d'ocul.*, vol., xcv., p. 227.

235. GUNNING. Sur la maturation de la cataracte. *Soc. franç d'ophth. ; Ann. d'ocul.*, vol. xcv., p. 226.

236. CHIBRET. Lois des déformations astigmatiques de la cornée consécutives à l'opération de la cataracte. *Soc. franç. d' ophth. ; Ann. d'ocul.*, vol. xcv., p. 209.

DE WECKER (222) reviews the different theories about the etiology of cataract which have been recently advanced. He regards the trouble as analogous to gangrene and distinguishes two forms : (1) Dry gangrene, where the cataract is hard and the nucleus not well defined. (2) Moist gangrene, in cataracta nuclearis with well-defined nucleus. MARCKWORT.

MEYHÖFER (223) thinks that cataract may be caused by radiating heat, and substantiates his opinion by four cases which he has observed in young glass-blowers of from twenty-four to twenty-nine years of age. He afterwards examined 506 glass-blowers and found opacities of the lens in 59 individuals, 42 of whom were under forty years of age. The left eye, which is the one nearest to the furnace, was found to be affected oftener than the other. Besides the radiating heat itself, Meyhöfer also considers the increased perspiration as an etiological factor in the production of cataract.

AYRES (224) relates two cases; in one the cataracts became complete, and one of them was successfully extracted; in the other a double iridectomy was made with excellent visual result.

BURNETT.

WARLOMONT (225) gives a short sketch of the history of cataract-extraction during the last twenty-five years. He does not state his own views distinctly, but he seems to be in sympathy with a number of French oculists who are in favor of abandoning the combined method of extraction. MARCKWORT.

CHISOLM (226) has abandoned dark rooms and bandages and simply closes the lids of his cataract patients with isinglass plaster, thereby increasing the comfort of the patient and diminishing the irritability so common after such operations. We can heartily agree with the author, for we have ourselves for more than two years been treating our cataract-operations in the open wards of a general hospital. Neither is the closure of the eyes with adhesive straps new, for we saw it done in Manchester ten years ago. BURNETT.

After performing the incision in the sclero-corneal margin, LAWRENTJEW (227) introduces a sharp hook into the anterior chamber, with which he tears the capsule from the lower pupillary margin upwards. In removing the instrument he hooks the iris, which he then cuts in the usual manner. HIRSCHMANN.

BETTREMIEUX (228) draws the following conclusions: (1) For the majority of cases of senile cataract Daviel's method of extraction is the only "classical" one. (2) The method of von Graefe, of which iridectomy is an integral feature, is suited for a certain class of cases only. (3) Iridectomy is indicated (*a*) as a preliminary operation for maturation, for optical purposes, and in certain complicated forms of cataract; (*b*) immediately before the delivery of the lens, when the iris presents an obstacle to the delivery, and when the patient is restless; (*c*) immediately after the delivery of the lens, if the iris has been bruised or cannot be replaced; and (*d*) some time after extraction, if there be prolapse of the iris. (4) In order to prevent suppuration it is necessary, besides the usual antiseptic precautions, to wash out the anterior chamber. Bettremieux recommends the antiseptic liquid of Panas (biniodide of mercury 1 to 20,000 with 2 p. c. of alcohol) and a 3-p.-c. solution of boric acid. In experiments made upon animals the latter solution was borne better, but its efficiency as an antiseptic is only one half as great as that of Panas' liquid. v. MITTELSTÄDT.

DE WECKER (232) recommends that after simple linear extraction without iridectomy the anterior chamber be syringed out with a solution of eserine (eserine salicylate 0.25, boric acid 4.0, distilled water 100) and that the bandage remain saturated with this solution for the first four days after the operation. This procedure has the following advantages: (1) Prolapse of the iris is prevented by the action of the drug. (2) Remnants of cortical substance which may have stayed behind will be removed. (3) It helps to re-establish the angle of the iris, and (4) to suppress conjunctival secretion. De Wecker discusses at length the recommendations of St. Yves, Heymann, Inouye, McKeown, Wicherkiewicz, and Panas as regards the way to wash out the anterior chamber. MARCKWORT.

WICHERKIEWICZ (233) deprecates the method commonly employed for the purpose of ripening immature cataracts. His procedure consists in flooding the anterior and posterior chambers with a solution of chloride of sodium of the strength of 7 to 1,000, which has been boiled and allowed to cool down to 30° C. (See Wicherkiewicz, *Klin. Monatsbl.*, Nov., 1885.) MARCKWORT.

GAYET (234) proposes that the anterior capsule be opened with the Graefe knife itself after its introduction into the anterior chamber. Chibret pleads for the exsection of the sphincter, whilst Abadie claims that all oculists (tout le monde) are now agreed that the operation without iridectomy is superior to that combined with iridectomy. MARCKWORT.

GUNNING (235) does not perform iridectomy when carrying out Förster's procedure for ripening immature cataracts. He merely punctures the cornea and then triturates the lens.

MARCKWORT.

According to CHIBRET (236) cataract-operations are followed by what he terms "astigmatisme mixte isocèle." While one of the principal meridians becomes hyperopic, the other becomes myopic to the same degree. For instance: A cornea has 40 dioptries in both its principal meridians before the operation, or 40 0° + 0. After the operation this changes to 37 90° + 6. In other words the vertical meridian has become hyperopic 3 dioptries, whilst the horizontal meridian has become myopic 3 dioptries. There is mixed astigmatism of 6 dioptries, the two components, as divided between the two principal meridians, being equal in degree. MARCKWORT.

XVII.—VITREOUS BODY.

237. ABADIE. Des hémorrhagies profuses du fond de l'œil chez les jeunes gens. *Ann. d'ocul.*, 1886, Jan. and Feb., p. 36.

238. RAMPOLDI. Ulteriori notizie e considerazioni intorno a un memorabile caso clinico. *Ann. di ottalm.*, vol. xv., 1, p. 11.

239. CHISOLM, J. J. A piece of iris living in the vitreous chamber—a novel foreign body. *N. Y. Med. Record*, Jan. 23, 1886.

ABADIE (237) draws attention to hemorrhages which occur in the fundus oculi of young persons. In two cases epistaxis preceded the ocular hemorrhage. The white blood corpuscles were diminished in number. Vision was entirely abolished for one day and longer. In one case, which afforded the rare opportunity of watching the process in an early stage, the ophthalmoscope showed fine hemorrhagic striæ along the course of the blood-vessels, which increased slowly in number as well as in width, and gradually covered the optic disc and the adjacent area of the retina in the form of broad patches which extended as far as the equatorial region. The vitreous body soon became opaque at the posterior pole whereby the hemorrhages were shut out of sight. The periphery was comparatively free. (Compare the observations of Eales and Nieden.) MARCKWORT.

RAMPOLDI (238), who five years ago published a remarkable case of lymphatic infiltration of the cornea on inclination of the head, has subjected the patient to a renewed examination. The symptoms which she complained of at the time, especially the transitory opacity of the cornea, have not returned, but the patient now complains of a movable, thread-like scotoma before the left eye. With the ophthalmoscope a cord-like structure can be seen, which originates from the arteria centralis retinæ and ramifies in the posterior third of the vitreous chamber. The color of this structure is red until the first division, beyond that it is of an ashy gray. Rampoldi considers it to be the canalis hyaloideus, rendered visible by being filled with opaque lymph. DANTONE.

CHISOLM's (239) patient was injured by a fall in which a splinter of wood entered the right eye. The eye presented the appearance of a successful cataract-extraction—pupil black with some slight capsular opacities. In the vitreous chamber behind the capsular opacity there was a flap of membrane, about one line wide and two lines long, rectangular in shape, and yellowish-white; it moved to and from with the movement of the eye. BURNETT.

XVIII.—RETINA AND FUNCTIONAL DISTURBANCES.

240. ANDERSON. A case of relapsing neuritis. *Ophth. Review*, vol. v., June, 1886, p. 121.

241. AYRES, S. C. Retinitis pigmentosa. *Amer. Journ. of Ophth.*, April, 1886.

242. SNELL. Retinitis pigmentosa and nyctalopia. *Ophth. Rev.*, vol. v., March, 1886, p. 72.

243. HIRSCHBERG, J. The development of ret. diff. spec. *C. f. A.*, Bd. x., p. 92.

244. HIRSCHBERG, J. Congenital syphilis the cause of severe ocular affections. *C. f. A.*, Bd. x., p. 97.

245. PERLIA (of Reuss' clinique). The ring-scotoma in syphilitic chorio-retinitis. *C. f. A.*, Bd. x., p. 39.

246. HAAB. Arteriitis syphilitica. *Correspondenzbl. f. Schweizer Aerzte*, March 15, 1886, No. 6.

247. DRANSART. De l'iridectomie dans le décollement de la rétine. *Soc. franç. d'ophth.*, 1886, April 29th; *Ann. d'ocul.*, vol. xcv., p. 222.

248. WARLOMONT. Décollement de la rétine et iridectomie. *Ann. d'ocul.*, vol. xcv., p. 153.

249. BENSON. Partial embolism of superior division of arteria centralis retinæ. *Ophth. Rev.*, vol. v., Dec., 1885., p. 1.

250. DUMONT. Nevrorétinite double. Plaques de chorio-rétinite. Hémiopie. *Bull. de la clinique nat. ophth. de l'hôp. des quinze-vingts*, vol. iv., No. 2, p. 86.

251. DA GAMA PINTO, J. R. Investigations on intraocular tumors. Glioma of the retina. Wiesbaden: J. F. Bergmann, 1886; 99 pages and 6 chromo-lithographs.

252. Straub, M. The gliomas of the organ of sight. Path.-anat. Studie aus d. Nederl. Gasth. voor Ooglyders in Utrecht. *v. Graefe's Arch. f. O.*, Bd. xxxii., 1, p. 205.

253. Treitel, Th. Contribution to the knowledge of glioma retinæ. *v. Graefe's Arch. f. O.*, Bd. xxxii., 1, p. 151.

254. Bettmann, Boerne. Blindness following hemorrhage. *Trans. Chicago Soc. of Ophth. and Otology*, 1886.

255. Anke, Richard (of Hirschberg's clinique). Night-blindness from hemorrhage during pregnancy. *C. f. A.*, Bd. x., p. 37.

256. Teillais. De quelques hémorrhagies oculaires pendant la grossesse. *Soc. franç. d'ophth.*, 1886, April 28th ; *Ann. d'ocul.*, vol. xcv., p. 213.

257. De Luca. Dell' ecclissi visivo. *Comm. alla R. academ. med. chir. di Napoli*, January, 1886.

258. Seguin, E. C. A contribution to the pathology of hemianopsia of central origin (cortex hemianopsia). *Journ. of Nervous and Mental Disease*, Jan., 1886.

259. v. Millingen (Constantinople). Partial affection of the chiasma. *C. f. A.*, Bd. x., p. 167.

260. Bergmeister, O. On toxic amblyopia. *Wiener med. Blätter*, 1886, 5 to 8.

261. Magnus, H. Case of transient amaurosis. *Zehender's klin. Monatsbl.*, Feb., 1886.

262. Standish, Myles. A case of alcoholic paralysis preceded by and accompanied with amblyopia ex abusu, with remarks. *Boston Med. and Surg. Journ.*, April 22, 1886.

263. Minor, J. L. The present standing of tobacco amblyopia. *Amer. Journ. Ophth.*, Feb., 1886.

264. Deeren. Amblyopie paludéenne, guérie par l'emploi de sulfate de quinine. *Rev. d'ophth.*, 1886, May, p. 276.

265. Teillais. De l'amblyopie par l'intoxication paludéenne. *Soc. franç. d'ophth.*, 1886, April 30th ; *Ann. d'ocul.*, vol. xcv., p. 234.

266. Changarnier. Amblyopie par le sulfure de carbone. *Rec. d'ophth.*, 1886, May, p. 280.

267. Gand. Amblyopie toxique (sulfure de carbone). *Bull. de la clin. nat. ophth. des quinze-vingts*, vol. iv., No. 1, Jan. to March, 1886, p. 40.

Anderson (240) reports a case of relapsing neuritis in a girl seventeen years of age, who complained of squinting, diplopia, and weakness of the lower extremities. This weakness had begun a year ago, and after having lasted for several months, it was noticed to have suddenly increased in the left leg one morning, on her getting out of bed, causing her to fall to the ground. There was no loss of consciousness. Two months later severe nausea supervened, but without headache or photophobia. She was annoyed by tinnitus in the left side of the head, resembling the singing of birds, and chromatopsia. The diplopia, which was homonymous, persisted. On being examined at the time of her admission to the hospital, astigmatism was detected. This having been neutralized by glasses, S proved to be = 1. The ophthalmoscope showed neuritis optica in both eyes. Although the patient was right-handed, pressure of her left hand was stronger than of her right. There was no disturbance of general sensibility, smell, or hearing; no paralysis of the tongue, the facial nerve, or the faculty of speech. Both patellar reflex and ankle clonus were absent. All the symptoms improved gradually, but a certain degree of strabismus of the right eye remained. After having remained in a satisfactory condition for over a year, she was again attacked with nausea, this time coupled with left-sided frontal headache, sore throat, and stiffness of the left side of the neck. S was normal; no neuritis or paralysis. Tinnitus again set in on the left side, and after the lapse of a few days marked neuritis of both optic nerves again showed itself. At a certain place in front of the left ear, where the patient located her subjective sensations of hearing, an objective sound could also be made out which was synchronous with the carotid pulse. This symptom gradually subsided, and after two months' treatment she was discharged from the hospital completely cured. Anderson's diagnosis in this case is tumor of the brain, and he expects that sooner or later new symptoms will develop. FITZGERALD.

AYRES (241) presents a statistical report of twenty-five cases, including nineteen families. There were eighteen males and seven females (28 per cent). Parents were related in 20 per cent. of cases; not related in 24 per cent. In 56 per cent. no record of relationship was taken. In eight families there were other ocular defects in some of the members. In three cases there was a tendency to glaucoma. BURNETT.

SNELL (242) observed night-blindness and retinitis pigmentosa in six brothers. A sister of theirs and another brother, who was the youngest of the family, had perfectly normal eyes. The parents were not related. Neither they nor their progenitors had any similar trouble. FITZGERALD.

HIRSCHBERG (243) assumes that there are several different forms of syphilitic retinitis. He gives an elaborate description of the symptoms and the course of a case of retinitis diffusa specifica of one eye. There were round, sharply defined, grayish-blue marginal arches, and a small hemorrhage at a distance of from four to five disc-diameters from the entrance of the optic nerve, both laterally and in a median direction. An extensive scotoma corresponded to the opaque portion of the retina.

HIRSCHBERG (244) publishes also three cases of affections of the eye due to congenital syphilis. (1) The first was that of a boy sixteen years of age, who was first attacked with panophthalmitis sicca in one eye, with detachment of the retina. After a short period of improvement diffuse parenchymatous keratitis made its appearance, which trouble also developed in the other eye, which had hitherto remained sound. The eyeball first affected became totally blind and painful, and was enucleated. In spite of this, and of mercurial inunctions, the other eye continued to grow worse. Symptoms of glaucoma now supervened, and iridectomy was performed, after which the cornea cleared up. A microscopic description of the eye enucleated is given. (2) In a twelve-year old girl with atrophy of the optic nerve of one eye in consequence of specific neuritis, the same affection began to develop in the other eye. This was followed by kerato-iritis diffusa, which healed under the influence of mercury. A gummous tumor of the sternum, which developed a year later, confirmed the diagnosis previously made. (3) A case of chronic iritis, with slight opacities in the vitreous, in a boy five months old, was cured by inunction.

HAAB (246) also observed a case of retinitis syphilitica, termed by him "arteriitis syphilitica," of one eye. Cured by mercury.

DRANSART (247), Warlomont, Chibret, and Martin recommend iridectomy for detachment of the retina. Galezowski has experienced only temporary improvement.

WARLOMONT (248) reports a case of detachment of the retina cured by iridectomy, pressure bandage, supine position, and injections of pilocarpine. (Whether the cure continued or not after the patient got up again and the bandage was left off, is not stated.—M.) MARCKWORT.

BENSON'S (249) case was that of a young man twenty-three years of age, whose right eye became blind suddenly. After the lapse of a few minutes vision returned in the lower half of the visual field, the upper half remaining blind. With the ophthalmoscope the lower portion of the retina appeared œdematous. After infiltration had become absorbed, a small flame-shaped hemorrhage could be seen near the outer lower portion of the periphery of the disc. Later on only slight vascular changes could be made out at this place. The patient had rheumatism four and one half years ago, and since that time had been attacked with chorea at three different times, the attack each time beginning on the left side. There was evidently some connection between these three morbid manifestations.

FITZGERALD.

In DUMONT'S (250) case the patient was probably syphilitic. After severe headache and epileptiform convulsions, paresis of both legs, more marked on the right side, and left-sided hemianopsia developed. V. MITTELSTÄDT.

PINTO (251) has made a microscopic examination of twelve cases of glioma of the retina. He gives a comprehensive review of the literature, and furnishes a clear anatomical and clinical picture of this affection. Pinto is inclined to agree with Hirschberg in regarding the inner granular layer as the usual starting-point of the disease, but does not consider this view to have been proved beyond any doubt. In one case the neoplasm had involved the lens-capsule and the interior of the lens. The description of this unique case is of particular interest. For details we must refer the reader to the original.

STRAUB'S (252) paper is an anatomo-pathological essay on glioma of the visual organ, based upon the examination of two cases of glioma of the retina, and of one of the optic nerve. He comes to the conclusion that this neoplasm originates in the connective tissue peculiar to the nervous system, as distinguished from ordinary connective tissue. The distinctive features between these two forms of connective tissue continue to be marked in pathological growths. Straub also aims at an exact separation between glioma and sarcoma. Sarcoma originates from cells derived from the mesoblast, and the walls of its vessels, which are embryonic in character, are formed by sarcomatous tissue. Glioma, being composed of neuroglia, is ultimately derived from the epiblast.

Treitel (253) publishes the history of an interesting case of congenital glioma of the retina in a boy two years and nine months old, with the results of a post-mortem examination. The neoplasm first appeared in the left eyeball and led to perforation of the globe. Enucleation was speedily followed by a relapse, whereupon exenteration of the orbit was performed. The child died shortly afterwards from meningitis. At this time the ophthalmoscope had already revealed papillitis and a subretinal tumor in the anterior inner quadrant of the right eye. The whole vitreous body was studded with numerous small nodules, which proved under the microscope to be gliomatous foci. Treitel assumes that the vitreous became infected with glioma by the way of the fœtal hyaloid blood-vessels.

Bettmann (254) relates two cases in full. The author is of the opinion that in such cases the bleeding from the stomach, gums, etc., is not the direct cause of the blindness, but that there is a concurrent hemorrhage bearing directly upon the optic tract. **Burnett.**

Anke (255) observed the development of hemeralopia after copious hemorrhages from the vagina of a woman in the ninth month of pregnancy. There was concentric limitation of the field of vision for white as well as for colors, and the appearance of a fog before the eyes before night set in. With the ophthalmoscope no changes could be detected.

Teillais (256) reports four cases of retinal hemorrhage during pregnancy. There was no heart disease, and the urine contained neither albumen nor sugar. The hemorrhages disappeared after delivery without leaving any ophthalmoscopic traces, and vision was fully restored. **Marckwort.**

In addition to his own case, whose history and autoptic findings are given in full, **Seguin** (258) has collected and tabulated all the other cases he has been able to find in which an autopsy was made, with five traumatic cases, making in all forty-six cases of central hemianopsia. His conclusions from a close study of these histories are: "1. That lesions in the mesal aspect of the temporal lobes, or even in the other basal districts of the hemispheres, may give rise to hemianopsia indirectly by pressing upon the primary optic centres or upon the tractus optici and chiasm. 2. That lesions of the corpus geniculatum lat., pulvinar, and latero-caudal parts of the thalamus may cause hemianopsia, or hemianæsthesia alone. 3. That a lesion of the white substance of the occipital lobe, in the caudal radiations of the internal capsule, may cause hemianopsia alone, or with hemianæsthesia. 4. That lesions of the supramarginal gyrus, angular gyrus, and inferior occipital lobule with the subjacent white substance, may cause hemianopsia—with or without other symptoms (hemiplegia, loss of muscular sense, word-deafness, etc.). 5. That a lesion of greater extent, involving the speech centre, the motor convolutions, and the parts enumerated above (4), due usually to embolism or thrombosis of the entire Sylvian artery, will, when existing on the left side, produce aphasia, hemianopsia, and hemiplegia. 6. That lesions of the occipital lobe, cortex, and subjacent white matter produce blindness when bilateral, and hemianopsia when unilateral. This conclusion is in accord with Exner (1881). 7. That a lesion of the cuneus and adjacent 5th temporal gyrus (Ecker) on one side produces lateral hemianopsia of the opposite side." BURNETT.

A girl of thirteen seen by MAGNUS (261) was suddenly attacked with amaurosis of both eyes without any ophthalmoscopic or general symptoms. After persisting for four months in spite of treatment, the amaurosis suddenly subsided in the course of one day. It is said that simulation could be excluded.

v. MILLINGEN (259) observed amaurosis and papillitis of the left eye and temporal hemianopsia of the right eye in a child six years of age with caries at the base of the skull. The right optic disc was almost perfectly normal. The author assumes that the chiasma was partially destroyed, but that the right temporal strand had escaped destruction. There was no autopsy.

BERGMEISTER (260) discusses the different forms of amblyopia produced by poisonous substances. Acute forms of amblyopia may be produced by quinine, santonine, salicylic acid, and bromide of potassium. The following substances cause chronic forms of amblyopia : Alcohol and tobacco (each separately and independently of the other), bisulphide of carbon and of chlorine, lead (either without any ophthalmoscopic changes, or with neuritis and retinitis and albumen in the urine), carbolic acid, santonine, osmic acid, opium, hasheesh, and snake poison.

The interesting feature about STANDISH'S (262) case, which was watched and reported very carefully, is that the use of a small amount of tobacco was sufficient to cause a relapse. The author is of the opinion that in the majority of cases tobacco is only an assisting cause of the amblyopia, the principal cause being the alcohol—and statistics are presented to that effect. BURNETT.

Minor (263) doubts the existence of a true tobacco amaurosis, and relates ten cases in which amaurosis was the marked symptom in heavy smokers. In all there was either complete restitution or great improvement in vision under iodide of potassium and strychnia—no reduction in the amount of tobacco consumed being made. Burnett.

Deeren (264) describes a case of amblyopia caused by malaria. The main symptom was anæmia of the optic discs. The pupils were equal ; the retina, choroid, and vitreous body were intact. Sulphate of quinine raised S from $\frac{4}{20}$ to $\frac{20}{20}$. Marckwort.

Teillais (265) distinguishes three forms of amblyopia due to the influence of malaria : 1. Amblyopia without any visible changes, caused by the specific action of the poison upon the optic nerve and retina. 2. Amblyopia caused by other disturbances, the nature of which can as yet not be accurately determined. 3. Amblyopia with visible changes in the background of the eye. According to Poncet amblyopia is frequent in malaria. The retina becomes permeated with pigment, and there are embolic foci in the choroidal vessels. Marckwort.

Changarnier (266) describes two cases of amblyopia in consequence of poisoning with bisulphide of carbon. The cases resembled those caused by alcohol and tobacco, but differed in so far as the vision of the patients was colored yellow or whitish-yellow. Marckwort.

The two cases of **Gand** (267) were those of workmen in a rubber manufactory. The influence of alcohol and tobacco as well as tabes could be excluded. In one case there were general symptoms, headache, vomiting, etc. In both cases S sank rapidly within the course of two months. The visual field for white was normal in both cases, and in one case also that for colors, whilst the other became completely color-blind. There was ischæmia of the optic discs. Nothing is said about the ultimate condition of the patients. v. Mittelstädt.

XIX.—OPTIC NERVE.

268. **Guiot.** Atrophie grise double consécutive à un abscès du sinus maxillaire. Guérison. *Bull. de la clinique nat. ophth. des quinze-vingts*, vol. iv., 1, No. 1, Jan.–March, p. 36.

269. **Peltesohn.** Causes and course of atrophy of the optic nerve. *C. f. A.*, Bd. x., pp. 45, 75, and 106.

270. Perlia. Contribution to acute rheumatic neuritis retrobulbaris. *Zehender's klin. Monatsb.*, April, 1886, p. 139.

271. Dumont. Fracture de la base du crâne. Atrophie des nerfs optiques. *Bull. de la clin. nat. ophth. de l'hôp. des quinze-vingts*, vol. iv. p. 84.

Guiot's (268) case was that of a stab wound behind the left ear. After the wound had healed the maxillary sinus began to suppurate. There was ischæmia of the optic discs and failing of S. After evacuation of the pus, all symptoms disappeared.

v. Mittelstädt.

Peltesohn (269) has tabulated 98 cases of spinal or cerebro-spinal atrophy of the optic nerve, which number forms 39.5 % of all cases (496) of optic-nerve atrophy observed at Hirschberg's clinique. There are 78 cases of tabes in the series. For an elaborate description of the symptoms, and for interesting details, the reader is referred to the original.

Perlia (270) treated a locomotive engineer for acute rheumatic retrobulbar neuritis, which first attacked the right side and then the left. The characteristic features observed were pain on moving the eyeball in any direction and absence of ophthalmoscopic changes. He was cured by mercurial inunctions while confined to a darkened room.

In Dumont's (271) case there was a fracture of the base of the skull, which probably began on the left side, and involved the sella turcica and the right petrous bone. On the right side there was blindness, deafness, and paralysis of the facial nerve and of the sense of taste. On the left side there was amblyopia and temporal hemiopia.

v. Mittelstädt.

XX.—INJURIES, FOREIGN BODIES, AND PARASITES.

272. Leber, Th. Extractions of cysticercus and inflammations produced by the parasite; from observations at the ophthalmic clinic at Göttingen. *v. Graefe's Arch. f. Ophth.*, Bd. xxxii., 1, p. 281.

273. de Wecker. On extractions of cysticerci. Reply to Prof. A. Gräfe's "Further Reports on Extraction of Cysticerci." *Arch. f. Ophth.*, Bd. xxxii., 1, p. 275.

Leber (272) publishes a report of fifteen cases of extraction of cysticercus performed by him. The parasite was under the conjunctiva in one case only, in all others it was either in the vitreous or under the retina. In two cases the diagnosis could not be made with certainty beforehand, on account of the turbidity of the refracting media. The operation proved a complete success in eleven cases, and a failure in three only. In two instances of failure the parasite was located in the vitreous chamber, and in one instance it was under the retina. Inflammation never set in. In one case S was restored to the normal standard. The improvement of S obtained in each separate case by the operation proved to be permanent. Attention was paid to the exact closure of the conjunctival wound. Culture experiments were made to detect the presence of microbes in the entozoic cyst, and in one case with success.

XXI.—OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

274. UHTHOFF. The diagnostic value of immobility of the pupil. *Berliner klin. Wochenschr.*, 1886, No. 3.

275. BORTHEN, LYDER. Ophthalmomalacie. *Rev. gén. d'ophth.*, 1886, January.

276. WHARTON SINKLER and C. A. OLIVER. Two cases of Friedreich's disease ; with a study of the ophthalmic symptoms. *Med. News*, July 4, 1885.

277. GENKIN. A case of ophthalmia neuroparalytica. *Trans. of the Med. Soc. of Kaluja-Russkaja, Medicina*, 1886, No. 9.

278. MOORE, W. O. Diseases of the eyes occurring in affections of the kidney. *N. Y. Med. Journ.*, April 17, 1886.

279. DEHENNE. Note sur l'emploi des injections souscutanées d'ergotine chez les diabétiques et les albuminuriques. *Un. méd.*, 1886, p. 529.

280. POOLEY, T. R. On the relation of uterine disease to asthenopia. *N. Y. Med. Journ.*, Feb. 13, 1886.

281. VULPIAN. Hémianesthésie alterne comme symptôme de certaines lésions du bulbe rachidien. *Progr. méd.*, 1886, p. 68.

282. BADAL. Recherches statistiques sur les manifestations oculaires de la syphilis. *Arch. d'ophth.*, vol. vi., No. 2, 1886, March–April, p. 104.

283. RAMPOLDI. Un caso di lebbra oculare. *Ann. di ott.*, vol. xiv., 5 and 6.

284. GRUENING, E. Reflex ocular symptoms in nasal disease. *N. Y. Med. Record*, Jan. 30, 1886.

285. Nieden, A. On the connection between affections of the eye and of the nose. *Arch. f. Augenh.*, vol. xvi., p. 381.

286. Burnett, Swan M. Affections of the eye accompanying mumps. *Amer. Journ. Med. Sci.*, Jan., 1886.

287. Redard, P. Rapport entre les affections dentaires et certains troubles oculaires. *Rev. d'ocul.*, 7, A., No. 5, May, 1885, p. 102.

288. Drake Brockmann. Severe recurrent hemorrhage after excision of the eye on a scorbutic subject. *Ophth. Rev.*, vol. v., Feb., 1886, p. 40.

289. Magnus, H. Case of alopecia totalis. *Zehender's klin. Monatsbl.*, March, 1886, p. 97.

290. Nieden, A. Four cases of alopecia totalis persistens. *C. f. A.*, Bd. x., p. 123.

291. Wicherkiewicz. Report of cases of alopecia totalis. *Zehender's klin. Monatsbl.*, April, 1886.

Uhthoff (274) examined the reflex pupillary mobility of a large number of patients suffering from different ailments, and tabulated 166 cases of reflex mobility. Among the patients suffering from tabes and presenting the phenomenon of iridoplegia reflectica, 25 per cent. had a difference in the pupil of both eyes.

Borthen (275) discusses the affection which has been termed "essential phthisis" by von Graefe and "ophthalmo-malacia" by Schmidt, and gives the history of one case which came under his own observation. A pressure bandage, applied during the course of treatment for lachrymal fistula, was the cause of the development of the disease in this instance. The symptoms were the following: ptosis, T−3, enophthalmos, pericorneal injection, cornea hazy and striated, and anterior chamber very narrow. The iris was normal and the pupil narrow. Two small white spots could be seen in the region of the macula. No pain. S $\frac{15}{200}$. Cured by instillations of atropia and leaving off the bandage.

A careful ophthalmic examination of one of these patients by Dr. Oliver (276) showed the condition as follows: Pupils round, 3 *mm* in diameter, and responsive both to light and accommodation; good movements of eyes, no diplopia, slight horizontal nystagmus on extreme convergence and divergence, disc gray in its deeper layers, fundus otherwise normal. $V = \frac{6}{6}$ in both. There was slight "subnormal" color perception at the centre.

The V F for white was contracted in all meridians to from 20 to 30 degrees. The yellow field was bounded by 20 degrees, blue to 15 in R, 5 to 8 in L; red 5 degrees in all directions in R, 2 or 3 in L. BURNETT.

In GENKIN'S case (277) the patient was seventy years of age, his mind was affected, and he suffered from neuralgia of the left trifacial nerve. The left pupil was narrower than the right. Without any traumatism whatsoever the left cornea began to ulcerate and rapidly sloughed away. In this case the trigeminus was not anæsthetic, but hyperæsthetic. On post-mortem examination a syphilitic tumor of the sphenoid bone was found which pressed upon the fifth nerve. HIRSCHMANN.

In addition to a general consideration of the subject of albuminuric retinitis, MOORE (278) gives the history of one case in which an abortion, produced at the eighth month, relieved a woman of total blindness from this disease. BURNETT.

DUHENNE (279) recommends subcutaneous injections of ergot in diabetes, especially before making cataract-extractions in such patients. In two cases of albuminuria this treatment also resulted in considerable improvement. MARCKWORT.

POOLEY (280) gives the history of twenty cases of eye disease in which some uterine affection was the producing cause. The commoner symptom was asthenopia, but there was also, in some cases, organic change at the fundus, paleness of the disc, hemorrhages, etc. Paresis of A, blepharospasm, and deiplopia were also found. BURNETT.

BADAL'S (282) statistics comprise 20,000 cases of syphilis observed in Paris and Bordeaux. The eye was affected in 671 cases (3.3 %). A double curve represents the age of the patients when syphilis was acquired and that in which ocular symptoms made their appearance. Badal considers iritis as one of the early symptoms of syphilis, and advocates antispecific treatment from the time of the primary affection without delay. He places choroiditis into the transitional stage between the secondary and tertiary periods. Still the largest number of choroidal affections develop within the first year after the initial lesion. When choroiditis is found apparently to begin at a later period, it ought to be borne in mind that it really may be a relapse. The paper is to be continued. v. MITTELSTÄDT.

RAMPOLDI (283) observed the case of a patient who showed leprous nodules on his face and his extremities, and in the mucous membrane of his mouth and pharynx. He treated him for exudation in the pupillary space and posterior synechiæ. He extirpated several pink nodules from the conjunctiva of the right eye near the cornea, in which the bacilli of lepra were found under the microscope. DANTONE.

GRUENING (284) gives the histories of eight cases in which a reflex relation between nasal and eye troubles was believed to exist. The features of the eye affections were : burning or smarting sensation in the eyes or lids, inability to fix an object in ordinary daylight, increased vascularity of the conjunctiva upon slight provocation, inefficiency of ocular or general treatment, efficiency of nasal treatment in spite of an absence of nasal symptoms.

BURNETT.

NIEDEN'S (285) paper contains a discussion of the interdependence of certain affections of the eye and nose, illustrated by the histories of four cases. Among ophthalmologists v. Hasner has been the only author who has hitherto paid attention to this matter. On the other side Ziem, Bresgen, and other rhinologists have collected a great deal of material. It would seem important to determine the exact relation between ozæna, epiphora, and chronic ophthalmia. Many affections of the eye which have hitherto been ascribed to scrofula, have been found to owe their origin to a pre-existing rhinitis. Anisometropia is often due to difference in the capacity of the two orbital cavities, the difference being caused by long-continued obstruction of one nostril during the period of growth. The cases described were the following : (1) Polypi of the upper part of the nasal cavity perforating first into the left and afterwards also into the right orbit. Exophthalmus of both eyes. Death under cerebral symptoms. (2) Myxosarcoma of the mucous membrane of the upper part of the nasal cavity, perforating the lamina cribrosa and the os planum and invading first the cranial cavity and thence both orbital cavities ; neuro-retinitis, ophthalmoplegia externa, bilateral exophthalmus, coma, death, autopsy. (3) Chronic empyema of the right frontal sinus and the ethmoid labyrinth, perforation into the right orbital cavity, dislocation of the right globe outwards and downwards, direct communication of the abscess with the nasal cavity. (4) Diffuse hypertrophy of the nasal mucous membrane, empyema of the maxillary sinus after typhoid fever, infraorbital neuralgia, blepharospasmus of the right side, evacuation and curetting of the nasal and maxillary cavities, resulting in cure.

Burnett (286) found that, in a boy of fifteen, during an attack of mumps, there was on the right side exophthalmus, ptosis, dilatation of the pupil, paresis of accommodation with diminished movements of the ball upward and downward. V was reduced to $\frac{4}{18}$. There was swelling of the upper lid, clear chemosis of the conjunctiva, and marked tortuosity of the retinal veins. All the symptoms subsided, and V returned to $\frac{4}{6}$ when last seen. Abstracts of eleven other cases are given. Burnett.

Redard (287) speaks of the influence of affections of the teeth upon the production of disturbances of the eye. Dental affections may produce pain and inflammation in the eye as well as amblyopia, amaurosis, cloudiness of the field of vision, spasm or paralysis of the ciliary muscle, or of other ocular muscles, and asthenopia. Redard reports a case of glaucoma in which Abadie performed sclerotomy twice without result. A painful root was now extracted on the same side on which the eye was affected, and the tension of the eye diminished considerably. v. Mittelstädt.

Brockmann's (288) case was that of a scorbutic patient in whom one eyeball had to be excised. He had repeated hemorrhages from the wound at intervals of two weeks, which ceased only after anti-scorbutic treatment had been instituted.

Fitzgerald.

Magnus (289), Nieden (290), and Wicherkiewicz (291) publish cases of alopecia totalis which occurred in children and in adults. All the hairs of the head, eyes, nostrils, beard, chest, and pubes fell out for some cause which could not be determined. This condition remained permanent. There was no paræsthesia anywhere. The nails remained unaffected. The offspring of the patients showed a healthy growth of hair.

MISCELLANEOUS NOTES.

Dr. E. Williams, of Cincinnati, has resigned, on account of ill health, the presidency of the ophthalmological section at the next International Medical Congress. Dr. J. J. Chisholm, of Baltimore, has been appointed president, and Dr. A. Alt, of St. Louis, secretary of the section.

Prof. Ferdinand von Arlt, of Vienna, and Prof. Friedrich Horner, of Zurich, are dead. Obituaries in our next number.

VOL. XVI. No. 2.

ARCHIVES OF OPHTHALMOLOGY.

UNITED STATES ARMY MEDICAL DEPAR

THE ANOMALIES OF THE OCULAR MUSCLES.

By Dr. GEORGE T. STEVENS, New York.

FIRST PAPER.

I.

AFFECTIONS of the ocular muscles may be divided into those which are physiological peculiarities and those which result from pathological conditions. It is proposed now to consider the first of these two groups.

In the normal adjustments of the eyes in the act of vision, two distinct classes of muscles perform each its separate office. The muscle of accommodation situated within the eyeball acting as focal adjuster for each eye, while the long muscles within the orbit direct the eyeballs in such a way as to bring the visual axes of the two eyes to bear upon the point for which the focal adjustment is made.

The two classes of muscles are in a sense independent of each other, yet in a very important sense in close and interdependent relation. In the discussion of the anomalies of the ocular muscles, then, the relation of these two classes is to be constantly regarded. The affections of the ciliary muscles, constituting the essential factor in the subject of the accommodation of the eye, become a subject of special study, and not to be considered in this connection further than in respect to the reciprocal influences of the two classes of muscles.

Such special conditions of the muscles of accommodation as may be necessary to refer to in order to obtain a proper understanding of their relations with the class of muscles more directly under consideration will be introduced as occasion demands.

The subject of anomalies of the directing muscular apparatus of the eyes divides itself again into two classes: first, those which permit of habitual binocular vision; second, those in which a blending of the images of the two eyes is so difficult as to be, in most instances, impossible. In the first of these two classes of faults, binocular vision is maintained by the expenditure of a greater amount of force than is demanded in perfect equilibrium of the ocular muscles; in the second, a psychical disturbance results which may have an important bearing upon the general physical condition of the individual subject of the anomaly. The two classes are in reality but different degrees of similar affections, and the classification depends upon the psychical presence or absence of the phenomenon of a fusion of images. Indeed, under certain circumstances, one of these conditions may pass into the other, and one who, in robust health, blends images habitually and with difficulty may, in a condition of impaired nervous energy, be quite unable to maintain a fusion of the images of the two eyes. Even the presence or absence of binocular vision, then, does not constitute an absolute and sharply defined line of classification. It also often happens that, with gross departures from the standard of equilibrium of the ocular muscles, habitual binocular vision is sometimes maintained, while in other instances comparatively moderate anomalies give rise to diplopia.

Such conditions must, however, be regarded as exceptional, and if the boundary, the sustained presence of single vision, like many of the boundaries of classification in science, is sometimes vague, it will on the whole be found practical and satisfactory.

Directing our observations first to the class of anomalies in which habitual binocular vision is maintained, we shall find a theme rich in interest and of pre-eminent importance in its practical bearing.

While it is true that some of the most illustrious names among those who have contributed to the notable progress of modern ophthalmology have been identified with the discussion of this subject, it is nevertheless also true that, considered in respect to its importance, comparatively slight attention has been bestowed upon it in the literature devoted to ocular affections. For the most important expositions in this department of ophthalmology we are indebted to Von Graefe, who left to the world, among his richest contributions to the literature of science, extensive memoirs upon subjects connected with the ocular muscles, replete with learning and original research. Investigators from his time have been, in large measure, content to accept the results of his splendid genius as in the main conclusive, and since his death it cannot be said that any very striking advance has been made in this direction. But Graefe's observations were those of a pioneer. They were not exhaustive, indeed they were, in respect to the class of affections now under consideration, incomplete and confined mainly, it may be said almost exclusively, to a single anomaly among several, and that one, as it will be seen, not the one of greatest practical importance. In these muscular affections in which, with absence of equilibrium the ability to maintain binocular vision remains, there is a tendency on the part of the eyes to permit the visual lines to deviate from parallel directions. Graefe, with others, taught that when the ocular muscles are all accurately proportioned in respect to their dynamic conditions, and the performance of binocular vision is accompanied with the least expenditure of energy, the ocular muscles are to be regarded as in "equilibrium." The tests, however, which have been applied to the determination of the presence or absence of equilibrium have not in all cases been sufficiently trustworthy, and it is desirable in the beginning of this discussion to determine precisely what is indicated by the term equilibrium, and to establish definite means of ascertaining, by the most conclusive methods attainable, the true conditions of the muscles in this respect.

Graefe regarded the ability to direct the axes of the two eyes to the same point, at the usual distance of reading, without excessive effort, as a practical standard of equilibrium, and taught that this should be gained even at the expense of very great loss of equilibrium at greater distances. Thus, in operating for relief of "insuffîcicncy of the interni," he was ready to induce very high degrees of "insufficiency of the externi," or even homonymous diplopia at a distance. As Graefe's operations were in large measure designed for the relief of "insufficiency of the interni," in cases of high grades of myopia, the great disadvantages of the loss of equilibrium at a distance were less pronounced than would have been the case under other circumstances. Such a standard of equilibrium should not be accepted. Equilibrium does not exist when comparatively easy fusion of images is gained at one point at the expense of difficulty or impossibility of fusion at another.

In equilibrium, the visual lines of the two eyes should be parallel when the force of the will in accommadating or adjusting the eyes is removed—that is, when the minimum of nervous impulse is directed to the ocular muscles. Deviations from a given standard of equilibrium short of the loss of power of fusion of images have been known as "insufficiencies." The term has, however, been mostly applied to an inadequate converging power for the distance of reading or ordinary work, and it has often, even by Graefe, been employed in connection with low grades of actual strabismus.

In the conditions of absence of equilibrium now under consideration, and as they will be discussed in this paper, there is, in the act of vision, no actual turning of one visual line in a direction differing from that of the other when looking at a distant point. Indeed, in gazing directly forward at a distant object parallelism is supposed. There is, however, in these conditions, on the part of some one or more muscles, a tendency to disturb the balance; and should the nervous control be so removed as to permit of the consummation of this tendency, an actual deviation would result. Such irregular tendencies, then, may exist in as many directions as there are forces to induce irregular tension—that is, not only in as many directions as there are muscles to act, but in as many directions as the muscles may combine to act. In short, then, these tendencies may exist in all directions. Without stopping here to discuss the question whether it is important to discover and to estimate the degree of all these deviations—a subject which will engage our attention further on,—we may here assume that all are important, and that no just appreciation of the conditions which induce asthenopic or kindred troubles can be acquired which does not take them all into account. It becomes necessary, then, to establish some method of investigating and of recording such anomalies.

So long as the increased tension upon the interni, in the act of reading, or in other continued work at a like distance, was regarded as the main, if not the only important factor in the causation of muscular fatigue, aside from accommodative lesions, the test of the dot and line, as suggested by Graefe for this condition, appeared to answer the requirements. This familiar test was made at reading distance, although Graefe counsels that, after having determined the degree of insufficiency for this distance, we should examine in the same way for greater distances. Without specifying the distances, he, in close relation to this part of the discussion, mentions his experience at abduction and adduction at a distance of six feet. This counsel, to determine the insufficiency at greater distances, judging from the literature of text-books, has been mainly disregarded, and indeed Graefe himself considered it of secondary, if not in most cases of little importance. The facts remain that in respect to this one test for a single condition there is not a well-established rule or custom. Even were complete uniformity observed in the examinations or records of this condition of the ocular muscles, this method is quite inadequate for the determination of several other conditions, and, as will be seen hereafter, extremely unreliable even for this one.

No just appreciation of the muscular balance can be arrived at while the accommodation is considerably exercised. Hence the principal determinations should be made at such distance as to render the accommodation practically relaxed, and while the determination of the inclination of the visual lines in the act of accommodation may be of importance, and may throw some light upon the false tendencies, it should not be regarded as a method representing the presence of equilibrium or of the degree of deviation from it.

Elsewhere[1] I have discussed the manner in which one may discover these faulty conditions. In order that in what is to follow there may be no misunderstanding, that the conditions under which the investigation of these visual tendencies are to be made and the manner of making them may be definitely understood, I trust that I may be pardoned for restating in as brief a manner as possible what was there more fully discussed. The head being in the "primary" position and the ocular muscles relaxed, while ametropia, if existing, is corrected by appropriate glasses, the subject of examination directs the eyes at an object, preferably a lighted candle against a dark background, situated at the distance of twenty feet. Diplopia is then produced by a prism. First of all diplopia should be produced in the horizontal direction, in order to determine the relative tendencies of the visual lines in the vertical meridian. If the prism is first employed with its base up or down, and especially if it is held before the eye for some seconds, there will follow a partial adjustment of the visual axes to the new condition, and if then the prism is placed horizontally, this temporary adjustment may appear in the test which is about to be made. A very slight adjustment of this kind is of much less importance in the tests for the lateral relations. A prism sufficient to prevent fusion of images at the given distance, but not so strong as to cause a wide separation of the images, is to be placed with its base inward and exactly horizontal. If now the two images of the object looked at appear to be precisely in the same plane, no tendency of one visual line to rise above the other has been shown. If on the other hand the images appear not in the same plane, a prism should be placed before one eye with its base up or down, and of such grade as will bring the mounting line down or the depressed one up to the plane of the other. The degree of prism marks the ascertained degree of tendency to deviate from the plane. For convenience in making this determination I have had made several pairs of spectacles containing, in each side, prisms of equal grade, 5°, 6°, and 7° each, with their bases in. The glasses are quite long and in the form of a parallelogram, in order that their exact position on the face may be accurately known. These spectacles are convenient in saving time and in assisting toward greater accuracy in the examination than is likely to be obtained by the use of the ordinary trial frame or from prisms held in the hand.

---

[1] *Archives d'Ophthalmologie* (Paris), Nov., 1886 ; *New York Medical Journal*, Dec. 8, 1886.

This test having been made with care, the prism is then placed before one eye with its base up or down. Graefe used a prism of 15°; for his tests were made at near range, but one of 7° or even less will, in ordinary cases, induce diplopia, and permit of more accurate judgment of the relative position of the images on the part of the patient. Any deviation from the vertical line is to be measured by the prism which will bring the images in line, as suggested by Graefe. By turning the first prism a certain number of degrees until the correction is made, we may also, the grade of the prism and the degree of the turning being known, estimate the degree of deviation. By these two procedures information in two very important directions is obtained; but the absence of positive evidence of anomalous tendencies, as shown by these tests, does not by any means prove the presence of equilibrium, and other means must be tried. Here the method of producing abduction and adduction is to be resorted to, not, however, at six but at twenty feet.

An experience in many thousand examinations leads me to believe that the standard of normal abduction should be about 8°, and that of adduction at about 50°. In respect to this last, however, the ability to overcome prisms equal to 50° implies, in most cases, an ability indefinitely exceeding this, and many who at the first trial can accomplish only one half of this will, after two or three attempts on different days, succeed in uniting images with the full strength of the adducting prisms. On the other hand, while the failure to overcome at twenty feet a prism of 8° with its base in should be regarded as suggesting an excess of energy over the others on the part of the interni, and while power to overcome a higher prism suggests a balance in the opposite direction, many cases occur in which the absence of ability to overcome a prism of 5° does not prove an inward tendency of the lines, nor does the blending with a prism of 10° or 12° prove a tendency outward. The ability to overcome a very strong prism with its base inward may be associated with actual converging strabismus, and the failure to overcome a comparatively weak one may be associated with an outward balance.

These results are to be compared with those already obtained by the diplopia tests when the prism is held vertically, but especially should they be considered in regard to any tendency of the visual axes to deviate in respect to the horizontal plane, for, as it will be seen, a very slight anomaly in this respect may modify the abducting or adducting power materially. In a like manner also, the ability to overcome a prism with its base up or down should be ascertained. Graefe declared his inability to overcome a prism of more than one degree in this direction at six feet, and states that, for nearly all those whom he tried, a prism of 2° was too strong. My own experience varies from this, for I have found that a very large proportion of the persons whom I have examined can overcome 2° or 3° at twenty feet, and I should place the average ability in cases in which no false tendencies exist in this direction at about 3°. It is not very uncommon to find persons who will overcome 9° or more in this direction. But it would appear to be of slight consequence whether the adjusting ability in this direction is rather more or less than 3°, if the power in one direction is equal to that in the other. An excess of power, however, leads to the suspicion that excessive demands arising from anomalous conditions have been imposed upon the muscles. The adjusting power is, in this respect, to be proved by placing the strongest prism which can be overcome before one and then the other eye in the same manner, or by reversing the prism before the same eye; for the effort at overcoming a prism with its base down before one eye, is identical with that for uniting with its base up before the other. If we consider the results of the examination in the horizontal direction in relation to those in the vertical, we shall be able to form an opinion concerning the presence or absence of equilibrium, and, if manifest deviating tendencies exist, of the direction and extent of such tendencies. It is not, however, to be assumed that these indications are absolute. They are, as a rule, correct so far as they are positive, but they do not of necessity permit us to determine the absolute degree of deviating tendency. Here, as in hyperopia, a latent anomalous tendency may exist but, unlike hyperopia, we have here no means of ascertaining at a single examination the absolute departure from the ideal standard. Notwithstanding no proof may have been obtained by these trials, latent tendencies of great importance may exist. Our tests determine the manifest conditions only, and it is a safe rule to consider that the deviating tendencies are never less than are shown by our trials, but that they may greatly exceed that which we are able to demonstrate.

Having determined in this manner the approximate condition of muscular adjustment when no effort of accommodation is demanded, we may proceed to a similar examination at a near point. For convenience we may adopt the distance at which the majority of people hold the page when reading. Tests made at the distance of one-half metre will sufficiently indicate the tendencies when the eyes are in accommodation for near work. Here prisms of greater angle than those employed for producing diplopia at a distance will be required, but the determinations may be made in the same general manner. Presbyopic persons should be supplied with reading-glasses in making this test, and the glasses for myopes should be such as are suited for the prescribed distance.

Terms by which we may express all the deviating tendencies which may be discovered in the manner indicated have been wanting. The imperfections of the nomenclature for ocular muscular anomalies have been discussed by myself in the articles already referred to, and a system of terms has been suggested. While, in order to avoid misunderstanding, the terms already familiar will, to a certain extent, be employed in this discussion, those which I have proposed will be used as the standard, and without apology for the innovation beyond what I have expressed in the former papers. The signification of these terms is repeated here:

"I. Generic terms. *Orthophoria* (ὀρθός, right, φόρος, a tending): a tending of the visual lines in parallelism. *Heterophoria* (ἕτερος, different): a tending of these lines in some other way.

"II. Specific terms. Heterophoria may be divided into: (1) *esophoria:* a tending of the visual lines inward; (2) *exophoria:* a tending of the lines outward; (3) *hyperphoria* (right or left): a tending of the right or left visual line in a direction above its fellow.

"This term does not imply that the line to which it is referred is too high, but that it is higher than the other, without indicating which may be at fault.

"III. Compound terms. Tendencies in oblique directions may be expressed as *hyperesophoria*, a tending upward and inward; or *hyperexophoria*, a tending upward and outward. The designation 'right' or 'left' must be applied to these terms.

"In recording the respective elements of such compound expressions I have employed the sign ∟. For example, if it is desired to indicate that the right visual line tends above its fellow 3°, and that there is a tending inward of 4°, the facts are noted thus: Right hyperesophoria 3° ∟ 4°."

II.

HYPERPHORIA.

By hyperphoria is meant the condition of the ocular muscles in which, with a minimum of tension, a deviation of one visual line above the other would result. Habitual binocular vision is assumed, although we shall see that it is probable that in a considerable proportion of cases in which hyperphoria of more than a single degree exists, the tendency to diplopia is so great that the subjects of the affection often surrender to it—a fact confirmed by the marked amblyopia often found associated with this muscular condition.

Among the varieties of heterophoria none exerts a more disturbing or injurious influence than hyperphoria. It is not only a condition giving rise in itself to great fatigue and perplexity, but it complicates and exaggerates all other faulty tendencies. When we recall the fact that with a fair adducting power one may overcome prisms of 50° with the base to the temples, and that with a good abducting ability a prism of 7° or 8° is easily overcome in the opposite direction, it will be apparent that muscles which do not ordinarily overcome more than a prism of three degrees, as is the case when the prism is placed with its base up and down, must be in a condition of great disadvantage when hyperphoria of one or two degrees exists. If we were to compare the relative nervous impulse demanded by the grade of the prism, which can be overcome in the different directions, then a deviating tendency of one visual line above the other (hyperphoria) of one degree would be equal to a deviating tendency outward (exophoria, insufficiency of the interni) of more than fifteen degrees. In other words, a faulty tendency of one or two degrees in the vertical direction falls little short of a diverging strabismus in importance. That this is actually nearly the relative importance of the two conditions appears evident from several considerations which arise from conditions found associated with hyperphoria. These conditions are local and remote. The local relate directly to the function of vision, to the adjustments of the eyes in the performance of the visual function, and to nervous disturbances of a functional or trophic nature in and immediately about the eyes.

The remote conditions relate to a great variety of disturbances of a nervous character in parts more or less removed from the eyes.

Hyperphoria of a low grade, as determined by a correcting prism, is very frequently attended by amblyopia. It is no unusual occurrence to find, in a case of hyperphoria which may be measured by a prism of 1° or 2°, vision of only $\frac{20}{40}$ or even less, while the refractive conditions are not far removed from emmetropia, and the ophthalmoscope reveals either no pathological state or only a slight tendency to the hyperæmia about the disc which is characteristic of irritability of the eyes from muscular irregularities. The relative number of cases in which such defective visual power exists will, to one who has not well considered the subject, appear to be out of proportion to the muscular defect. The surprise will, however, give place to conviction if we bring clearly to mind the actual effects from the standpoint of physiological optics, of a very slight faulty tendency in the vertical direction. An actual deviation of a single degree would result in a separation of images at a distance of one half metre, approximately of 6.4 *mm.* A patient, then, with this amount of deviating tendency, who would bring the letters of the type in which this page is printed, even in contact, the lower border of the upper image touching the upper border of the lower, would require to exert a force upon the superior and inferior muscles greater than Graefe was able to exercise. If, however, by long practice, the muscles engaged in overcoming this fault acquire unusual strength, as is actually the case, still, when the tension has been continued for a considerable time, or when the general nervous tone is diminished from fatigue or ill health, an almost irresistible tendency to diplopia will occur. The remedy for the confusion thus induced is a renewal of the inordinate muscular tension or the suppression of the image of one of the eyes. This later really takes place, and the image suppressed is liable to be that of the eye in which greatest refractive anomaly is found, if a difference exists, or if the eyes are equally well adapted for clear vision the suppression occurs alternately. Hence, with a greater refractive anomaly in one eye, amblyopia will usually be found principally in the less perfectly constructed eye, while if the eyes are nearly or quite alike, the amblyopia will exist equally in the two eyes. Exceptions to this rule exist, especially in cases where, with myopia as the ametropic condition, the myopic eye is employed at the near point, while the more perfect eye is used for distant seeing.

The extent to which amblyopia exists in connection with hyperphoria is illustrated in the following tables. One hundred consecutive cases in which there existed hyperphoria, and in which no disease or injury of the eyes was found, and in which the refractive errors were not sufficient to account for any considerable defect of vision when correcting glasses were used, are included in the tables, excluding cases of high grades of refractive errors. The highest grade of astigmatism not exceeding 3.00 D, the highest of hyperopia not exceeding 4.00 D, and the highest of myopia not exceeding 5.00 D.

TABLE I.

Refractive error.	1.00 D or less.	More than 1.00 D; not exceeding 2.50 D.	More than 2.50 D to 4.00 D.	More than 4.00 D to 5.00 D.	Total.
Emmetropia .					45
Myopia . . .	9	19	7	7	42
Hypermetropia	37	24	12		73
Astigmatism .	28	7	5		40
	74	50	24	7	200

Acuteness of vision.	Refractive error.						Total.
	1.00 D or less.		More than 1.00 D; not exceeding 2.00 D.		More than 2.50 D; not exceeding 5.00 D.		
	Best eye.	Worst eye.	Best eye.	Worst eye.	Best eye.	Worst eye.	
$\frac{20}{20}$	38	21	7	7	4	4	81
$\frac{20}{30}$	22	15	8	8	1	5	59
$\frac{20}{40}$	6	8	3	7	3	4	31
$\frac{20}{50}$	1	2	2	5	1	2	13
$\frac{20}{70}$	1	1	1	2	2	2	9
$\frac{20}{100}$		3				2	5
$\frac{20}{200}$		1				1	2
Total	68	51	21	29	11	20	200

In the first table the proportion of eyes affected with different grades of refractive errors is shown; in the second, the acuteness of vision according to the refractive condition.

The vision of the best- and worst-seeing eyes in each grade is given but for convenience, in the estimate of the comparative value of the best and worst, in all cases where vision is equal in the two eyes one is reckoned as best and the other worst. If anisometropia exists to the extent of bringing the refractive conditions of two eyes in different columns, the vision of one eye only is placed in each column.

From the above tables we obtain the following approximate results:

Average Vision of Best Eyes.

Sixty-eight with less than 1.00 D refractive error, $\frac{16}{20}$.

Twenty-one with more than 1.00 D and less than 2.50 refractive error, $\frac{13}{20}$.

Eleven with more than 2.50 D and less than 5.50 D refractive error, $\frac{13}{20}$.

General average of vision of 100 best eyes, $\frac{20}{30}$.

Average Vision of Worst Eyes.

Fifty-one with less than 1.00 D refractive error, $\frac{14}{20}$.

Twenty-nine with more than 1.00 D and less than 2.50 D refractive error, $\frac{12}{20}$.

Twenty with more than 2.50 D and less than 5.50 D refractive error, $\frac{11}{20}$.

General average of vision of 100 worst eyes, $\frac{20}{50}$.

It will be seen from the above table that defective vision is rather the rule than the exception in moderate degrees of hyperphoria. It is a fact that must have occurred to every experienced oculist, that in anisometropia a material difference in the visual power of the two eyes is exceedingly common. But it is also true that in anisometropia a difference in the form of the orbit is quite common, a fact which would tend to a failure of equilibrium in the length or strength of the motor muscles of the eyes. Experience confirms this reasoning, and I have found that instances of even approximate balancing of the eye muscles in anisometropia is rather exceptional.

From the facts thus ascertained it becomes evident that amblyopia is not only very commonly associated with hyperphoria, but that it is not uncommonly a result of that anomalous condition.

A peculiar and interesting visual disturbance, related to yet differing from amblyopia, is the inability of the subject to see small objects clearly, although for larger objects, at the distance of some feet, the visual power is fair or even good. Thus, one may be able to read No. XXX., or even No, XX. of Snellen's scale, and may have no especial fault of accommodation, yet when No. I. is presented at the distance of one foot, the patient is quite unable to read. Small objects or characters are seen indistinctly or not at all. The fault in these cases appears to consist in an inability completely to fuse the images of the two eyes, while the separation is not sufficiently great to enable the patient to easily suppress one of them. This phenomenon is illustrated in the confusion which appears when one reads the word here doubly printed: *Accommodation* If we cover with a card the lower range of type, the word is perfectly clear. A corresponding result may be effected in a considerable degree of hyperphoria by the mental suppression of the upper or lower rank of letters. If, however, the separation is less complete, as in this instance: *Accommodation* we are quite unable to exclude either of the confusing ranks, as in the former experiment with the card, and the difficulty of a mental exclusion on the part of the subject of hyperphoria in this latter case is likewise greater than in one of more complete displacement. That only a comparatively small proportion of hyperphoric persons experience in marked degree this inability to see small objects well, is probably to be accounted for on the principle that in the great majority of instances the subject of hyperphoria is able either to fuse the images completely, or to displace them to such an extent as to enable a mental exclusion of one image to take place.

The conditions in hyperphoria relating to the adjustments of the eyes through the influence of their motor muscles are extremely interesting and important. The disturbing effects upon the lateral equilibrium is especially noticeable, and is a source of great perplexity to the oculist in his examinations of the muscular conditions. In hyperphoria the tests for lateral deviations are very often contradictory, and in a very considerable proportion of cases unsatisfactory. Unless the examiner is on his guard against the anomaly under consideration, he is liable to fall into grave errors of diagnosis and of practice. These errors are especially liable to occur if we rely for evidence for muscular balance upon the near test as suggested by Graefe. By such a trial we are, in moderate degrees of hyperphoria, likely to find extreme grades of "insufficiency of the interni," when in fact, if the test is made at a distance of twenty feet, the contrary condition is found. It is not an unusual occurrence with the existence of a single degree, or even less, of hyperphoria, to observe with actual esophoria of 2° or 3° (prism) an apparent exophoria in accommodation of 10° or even 15°. Such results illustrate forcibly the danger of relying upon the dot and line test, or upon any similar test at the near point, for determining the propriety of an operation for tenotomy of the externi. Indeed it will not be out of place to remark in the most emphatic manner that the test for "insufficiency" made at the near point should never be taken as a guide for an operation.

This principle of apparent contradiction is well illustrated in the following interesting case. A gentleman was found to have so strong a tendency of the visual axes to deviate inwards that at distances of twenty feet much difficulty was experienced in maintaining single vision. A relaxation of the force of the external recti muscles habitually resulted in homonymous diplopia. The insufficiency as measured by prisms was, however, not more than four degrees. On the contrary, if the gentleman held a pencil or his finger before him at the distance of fifteen or eighteen inches from his eyes, crossed diplopia occurred from "insufficiency of the interni." A pencil held at fifteen inches was doubled to such an extent that the two images appeared about an inch separated. By the test of the dot and line the insufficiency was only about 6° or 7°.

This gentleman was found to have hyperphoria of 5°, and an operation for the relaxation of the superior rectus of one eye was made, followed a day or two later by relaxation of the inferior rectus of the opposite eye. On the day following the last operation there was no diplopia or even "insufficiency of the interni" at the near point, and binocular vision was maintained with ease at the distance. Several months later the gentleman again complained of double vision at near points, and it was found that hyperphoria of 2° in the same direction as before was now manifest. The inferior rectus of the upward tending eye was now advanced, bringing the visual axes to the same plane, when again the troublesome diplopia at the near points disappeared entirely.

A lady has crossed (heteronymous) and vertical diplopia, both for distant and near points. If a prism of 12° with its base down is placed before one of the eyes, she has at the distance of twenty feet "insufficiency of the externi" of 3°, but if no vertical prism is used, one of 4° with its base in will bring the two images to a vertical line, thus showing insufficiency of the externi with the strong vertical prism, and "insufficiency of the interni" without it. If now a prism of 6° with its base up before the right eye, or with its base down before the left eye, is used, the images of the two eyes blend perfectly.

Thus it appears that as the result of the deviating tendency upward an "insufficiency of the interni," both at near and distant points, may be simulated, while in fact the visual axes may be inward. Not only does the existence of hyperphoria often give rise to an apparent exophoria in accommodation when the real tendency of the eyes is inward, it also frequently presents the indications of exophoria at a distance while the abducting power is much restricted. We may, for instance, find exophoria 2° or 3° (prism), or even more, with a power of abduction not exceeding the apparent exophoria. Here is an evident contradiction, and it may be, so long as the hyperphoria exists, impossible to determine whether our tests actually indicate an inward or an outward tendency of the visual lines, or neither of these conditions. It is because this important fact of the difference between the relation of the visual lines at a distance and those at near points has in many cases been overlooked, that surgeons of distinguished ability have sometimes performed tenotomy of the externi in cases of supposed "insufficiency of the interni" with the result of obtaining homonymous diplopia, without relief to the symptom of asthenopia. When once the hyperphoria is relieved by operation, we may hope for a more perfect determination of the condition of the lateral muscles. It is not proposed here to discuss the physiological reasons for the complications found in the muscular test when hyperphoria exists ; this is a subject presenting many important difficulties, and the phenomena described can be fully explained only by actual experiments upon the muscles themselves. The evidences which may be found, however, that very marked "insufficiency of the externi" may exist when the accommodating and converging functions are at rest, and of "insufficiency of the interni," of possibly very high grade when these functions are exercised, illustrate the very unsatisfactory nature of the terms which have been so long employed in this connection, and appear to demonstrate that the use of terms having such opposite and misleading significations should be discontinued. The relation of myopia to muscular anomalies should occupy a prominent place in the discussion of the conditions dependent upon hyperphoria, but for reasons which will be given, that subject will be reserved for examination in the chapter on exophoria.

Another local affection caused by hyperphoria is hypersecretion of tears, by which the fluid fills the conjunctival sac and overflows the eyelids, causing much inconvenience and often disturbance of vision. These cases simulate the conditions found in obstruction of the nasal duct, and the absence of a general understanding of their nature is illustrated in the frequency with which such cases present themselves for treatment, after having been subjected perhaps for many months to the process of probing the tear passages without any success in relieving the affection.

A branch of the fifth nerve supplies the lachrymal gland, and irritations to this nerve resulting from the efforts of correcting hyperphoria may result in so stimulating the gland as to induce the hypersecretion of tears, or it is quite possible that the pressure of the eyelids, which is often brought to bear to assist the ocular muscles in the performance of their duties, may expel the fluid from the gland in inordinate quantities.

Certain marked facial expressions and certain attitudes are characteristic, though not by any means constant in hyperphoria. Certain patients affected with this anomaly when looking indifferently, the eyes not specially directed to any object, will often present an appearance of moderate strabismus, more frequently diverging than converging. One of the eyes may even be observed to swing outward and then inward, giving a certain unsettled expression to the countenance. If, with even these strong indications of ocular deviations, tests for equilibrium are made, the result may be that either slight or even no evidence of lateral vicious tendency will be found. Involuntary convulsive contractions of the muscles of the face, giving rise to habitual distortion, constitute an important indication in some instances, of the efforts which are being made to overcome the effects of hyperphoria.

The habitual spasmodic closure of the lids of one eye should always direct the oculist's attention to the relations of the visual axes in the horizontal line. An effect upon the physiognomy not unfrequently observed is a rigid stare, the eyes being opened very wide, and all the facial muscles being apparently in a state of tension; associated with this peculiarity there is sometimes observed a tendency to snap the lids together forcibly and almost spasmodically.

The characteristic attitude of the head is even more striking and much more frequently observed. The head is carried toward the shoulder, usually to the side corresponding to the eye which tends below the other. This appears at first thought to be quite inconsistent with the demands for relief. But when we remember that the object seen by the upward tending eye appears lower, and that seen by the downward tending eye appears higher, than the other, it becomes evident that by carrying the head toward the lowest tending eye the images of the two eyes are brought more directly into the horizontal line. In a certain proportion of these cases the contraction of the muscles of the neck becomes permanent, demanding for relief tenotomy of the tendons of the sterno-mastoid muscle ; but in much greater number the muscles of the neck will regain their equilibrium either speedily or after some time, when once the vicious ocular tendency is removed.

This peculiar carriage of the head is much more common than would be supposed by one who has not specially investigated the subject. To a close observer familiar with the fact, the false relations of the eye muscles is very often reached even before any of the technical ocular tests are made. Graefe spoke of the turning of the face to one side in cases of "insufficiency of the interni," in order to obtain relief to the lateral muscles or to assist in the mental exclusion of one image. The attitude of carrying the head toward one of the shoulders in hyperphoria is even more characteristic and much more common, and in this case serves to permit of more easy fusion by raising one image and depressing the other. As has been observed above, correction of the deviating tendency of the eyes is followed by an habitual erect carriage of the head.

The more remote results of hyperphoria are those common to anomalies of the ocular muscles, but with certain special characteristics. Neuralgia, neurasthenia, insomnia, chorea, and epilepsy are among the manifestations of this condition. Much more than esophoria or exophoria is hyperphoria inducive of vertigo and epilepsy. The nervous disturbance arising from this cause is more perplexing, both from the difficulty in overcoming it by ordinary effort, and from the complications arising from it in respect to the converging and diverging efforts, than moderate grades of deviating tendencies in the lateral direction. Hence, nervous phenomena of a higher intensity are liable to result from this condition. The constitutional effects of hyperphoria are well shown in the following illustration :

This case was seen and treated at the Willard Asylum for the Insane. It is proper to remark that this institution is not designed for acute cases, or those in which there exists a reasonable prospect of recovery. It is a home for incurables, and the case here reported was one of chronic epileptic mania belonging to that class. The history is given as it was furnished by Dr. P. M. Wise, the superintendent, and Dr. H. E. Allison, the physician under whose immediate charge the patient was.

M. L., female, aged thirty-six. Insanity commenced seven years previous to the present record, but the patient has been subject to epilepsy for an unknown period, certainly longer than the period of insanity. About once a month she is taken with a series of epileptic seizures, varying from three to eight or more, and at these times is liable to become greatly excited, the degree of excitement depending apparently upon the number of convulsions. A period of great exaltation and frenzy follows, during which she is furious, sings wildly, and shouts at the top of her voice, and is exceedingly destructive and violent. The paroxysm may last several weeks. When it has subsided, she becomes orderly, neat, and industrious, and usually continues so until another series of convulsions occurs.

She was first seen by me July 31, 1886. Examination of the eyes showed hyperopia of moderate degree and right hyperphoria 4° (prism). Glasses for the correction of the hyperopia were furnished, and tenotomy of the right superior rectus was made, followed within a few days by a similar operation upon the left inferior rectus. This final operation was made August 22d. Bromides, which had been previously freely administered, were withdrawn July 31st. August 26th, four days after the last operation, a period of moderate excitement, very much less pronounced than usual, commenced, which lasted until Sept. 12th. On Jan. 2, 1887, five months from the beginning of the ocular treatment, Dr. Allison wrote concerning Miss L. : " She has not, thus far, had any attack of maniacal frenzy, and only one attack (that which is above mentioned) of excitement, which was not great. She says she has not had any convulsions. . . . She is very much improved, and feels very grateful."

A single other instance will suffice here to illustrate the constitutional effects of hyperphoria:

A lady gave me the following history of her physical condition: She had been subject to asthenopia, severe headaches, vertigo, and backache during all her life, and had hardly experienced any relief during her waking hours. Fifteen years before my acquaintance with her she had been insane, and had been taken to an insane asylum, from which she was removed after a period of nearly one year, but only to return. She was not free from illusions for nine years. With the restoration of reason a new form of nervous manifestation was exhibited. Habitual and frequent paroxysms of vomiting have now continued during several years. The paroxysm commences by seeing every thing in confusion, followed by an indescribable nervous sensation in the back, and finally by violent retching and vomiting, which is greatly intensified when the lady opens her eyes. The paroxysms continue from two or three days to several weeks; the last attack lasted six weeks.

She was found to have right hyperphoria 5°. She was furnished for a time with prismatic glasses, which established a nominal correction of hyperphoria, and after a few weeks tenotomy of the superior rectus of the right eye was made. The paroxysms of vomiting did not return, the lady was relieved of the distressing pain in the head, and soon after the tenotomy she expressed herself as feeling in every way better than she had done during the past twenty years. The lady was not seen during several months, but when finally she did present herself, she complained of suffering again from symptoms of asthenopia, but no more from the general nervous condition. Hyperphoria of 2° was found still to exist, which could not be discovered soon after the operation was made. Another tenotomy has since been made, which has been followed by relief to the asthenopic symptoms.

It will be seen that attending this muscular anomaly, headaches, pain in the back, vertigo, insanity, and habitual vomiting constitute prominent features which followed this lady from infancy; one form of trouble succeeding another, and possibly replacing it for a time, but from some manifestation of which she was never free until she was relieved from the necessity of a most difficult and perplexing ocular adjustment. With this release came relief from the whole train of nervous symptoms.

Treatment of Hyperphoria.

The treatment of hyperphoria is tenotomy. If the patient is unwilling to submit to a radical relief, or if the surgeon hesitates to perform the operation, if complicating circumstances render such an operation inadvisable, other means may be resorted to. The use of a prism, with its base up or down, is indicated under such circumstances. Let it be remembered that while glasses are of inestimable value, they are still inconvenient and often extremely so ; that with the best art of the optician, glasses detract from the symmetry and expression of the face, a fact of much importance to females at least ; and finally, that in the conditions of muscular deviations, they neither cure nor afford as complete temporary relief as a removal of the actual defect. Indeed, it is not uncommon for one having hyperphoria of 1° or 2° to suffer much pain in or about the eyes while wearing a correcting prism, but to experience almost immediate and complete relief from all the symptoms caused by the mal-adjustment of the eyes, as soon as tenotomy is performed. Glasses are like crutches, desirable when defects which render them useful cannot be removed. A special disadvantage of a very weak prismatic glass is the fact that it reflects a false image of every strongly illuminated object, seen at some distance, just above or just below the true image. This false image is often extremely annoying.

The daily exercise, continued through two or three weeks, of overcoming prisms placed vertically before the eyes alternately, with the bases in the same direction or before the same eye with the prism reversed, may tend to give the muscles greater vigor, and hence to enhance their ability to endure the difficulty. The duration of the exercise should not exceed three to five minutes at a time.

If tenotomy is performed, the surgeon must choose between relieving the tension of the superior rectus of one or the inferior rectus of the other eye. If it is evident that the defect can be located in one or the other muscle, of course his treatment should be directed accordingly. This is possible in a very considerable proportion of cases. The appearance of the eyes, when the patient's view is directed indifferently in space, will often aid in forming a correct judgment. The fact that, ametropia being corrected, the vision of one eye is less than that of the other, is a strong indication that this is the deviating eye.

If it is impossible, as in a certain proportion of instances it appears to be, to determine to which of the eyes the anomalous tendency is to be attributed, we are left to select upon more general principles the one to be subjected to the tenotomy. The inferior recti are those which possess the greatest power, and therefore a slight advantage taken from one of these in favor of the weaker muscle will, other circumstances being equal, cause, if possible, less change in the motile functions of the muscles than in the opposite case. If the hyperphoria is of considerable grade, it is better, unless there are very positive indications that the fault lies in a special muscle, to gain the relief by relaxing both the superior rectus of one eye and the inferior of the other. By this procedure, no practical restriction results to the movements of either eye in the vertical direction.

The method of performing tenotomy in these cases of deviating tendencies less than strabismus, has been described by me some years since.[1] Since that time I have found it advisable to modify the procedure somewhat, rendering the operation more simple and the results more satisfactory. As now performed, the eyelids being retracted, a fold of the conjunctiva is seized by a fine but rather rigid pair of mouse-tooth forceps, parallel with the course of the muscle and exactly over its insertion. With a pair of small narrow-bladed scissors, having blunt but very perfectly cutting points, a transverse incision is then made through the membrane, exactly corresponding to the line of insertion of the tendon. The conjunctival opening thus made should not exceed in extent one fourth of an inch. With the forceps now pressing the outer cut edge of the conjunctiva slightly backward toward the course of the tendon, the latter is seized behind but very near its insertion. The distance may depend upon the freedom with which the intended section of the tendon is to be made. But in hyperphoria or in slight relaxations of the lateral muscles, a distance barely sufficient to allow a small part of the tendon to be raised from the sclera is all that should be allowed. Making some tension now with the forceps, the points of the scissors are directed against the central portion of the tendinous insertion and toward the sclera, when a small opening is made dividing the centre of the tendinous expansion exactly on the sclera. The small opening is now to be enlarged by careful snips of the scissors toward each border, keeping more carefully on the sclera as the border of the tendon is approached. As the section of the tendon is carried toward the borders, the outer blade of the scissors passes beneath the conjunctiva. If the relaxation of the tendon is to be slight, the extreme outer fibres of the tendon are to be preserved untouched; but if a considerable effect is desired, these fibres can be entirely severed, *provided that the reflection of the capsule of Tenon upon the tendon is not disturbed.* By means of the capsule acting as an auxiliary attachment, the tendon is held in position, but is allowed to fall back slightly while maintaining its relation to the eyeball. In this respect, and in preserving the outer tendinous fibres, this operation differs radically from the ordinary operation for strabismus, and from any operation which has been proposed for so-called " partial tenotomy " of the recti muscles.

---

[1] "Irritation oculo-névrale" : Mémoire de l'Acd. Royale de Méd., Belgium, 1883.

The judgment of the operator must determine the extent to which the division should be carried, but should it be found that too little has been accomplished, the section can be extended. In doing this, the use of a very fine hook may be advisable. For this purpose a hook very much smaller and more delicate than the ordinary tenotomy hook should be employed. Its rounded point is carried under the remaining border of the tendon with great care, to prevent hemorrhage or unnecessary disturbance of the connective tissues; the extension being made toward one and then toward the other border, as the demand for further relaxation may require. When the remaining band of fibres is made tense by the hook it is slightly elevated from the sclera, when the fine-pointed scissors are introduced beneath the conjunctiva, and the necessary extension of the wound is made with extreme caution not to divide the capsular attachment. The conjunctival suture should in no case be employed.

All bandaging of the eye or covers of any description are not only needless but mischievous. Indeed, if permitted to digress from the subject at issue, I would express my unqualified disapproval of bandages in nearly all operations about the eyes. During many years I have abstained almost entirely from the use of bandages in ophthalmic surgery, and know of no reason to regret this course. Bandages are promoters of heat, filth, and septicism. They have no possible advantage, and should, I believe, go out of fashion in ophthalmic operations. My own patients are permitted to return at once from the operating-room to their homes without regard to weather or the distance to be travelled. Many of them return on the day of the operation to their ordinary business.

In respect to the results of tenotomy for hyperphoria there would appear to be nothing in the range of surgery more satisfactory or certain. My first operations for the correction of a tendency of the visual lines to deviate in the vertical direction, and in which no vertical strabismus existed, were made in 1875. Very many were made in each succeeding year, but it was not, however, until during the past two years that the operation in my hands became as uniformly successful as could be desired. Now, with the procedure which has been described above, there is a great measure of certainty of success. During the year 1886 I performed tenotomy for the relief of hyperphoria one hundred and nine times in eighty-eight cases. The result in nearly every instance was, when the patient was last examined, a relief either partial or complete to the hyperphoria. In some instances in which, soon after tenotomy, no hyperphoria could be discovered, a partial return to the original condition has been found, and quite possibly this may be true of some who have not been seen since within a month or two of the operations. Of those in which a partial but incomplete relief to the hyperphoria has been accomplished, some are still under observation for treatment. Among these are two cases in which tenotomy of both externi has been performed by prominent oculists, in each instance leaving the patient with homonymous diplopia and pronounced hyperphoria, unless, in one instance, the vertical deviation should be regarded as an original vertical strabismus. In both instances nearly complete correction has been accomplished, and there seems no doubt that in the end equilibrium in all respects will be established.

Of the cases which have been stated to be correct when last seen, it may be repeated that it is possible that, at a future time, hyperphoria of a certain degree may become manifest. This happens in a proportion of cases after some weeks or months, and it is not safe to assume that no hyperphoria exists until many months after the operation.

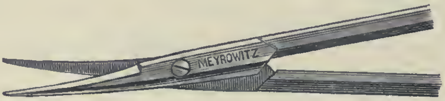
In respect to the results of treatment of hyperphoria it is my purpose only to say here that the relief in uncomplicated cases is of the most marked, not to say surprising, character. Many patients who, from this cause, have suffered from distressing affections during many years recover, when this source of irritation is removed, with astonishing rapidity.

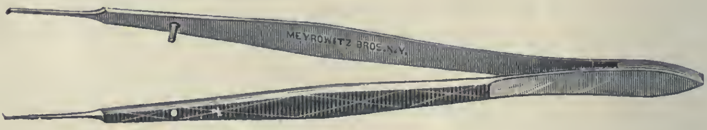
With little admiration for the practice of introducing slight modifications of well-known instruments as new designs, I think it reasonable, when the old instruments are evidently unsuited to new operations, to suggest such changes as will adapt them to the new conditions. It is in this spirit that I venture to describe such modifications of familiar instruments as I have found best suited to the operation for the relief of the ocular muscles as it has been described in this article.

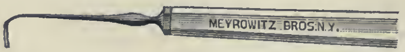
The scissors have narrow yet strong blades, cutting perfectly at the points, which are blunt, in order that they may not endanger the sclera. The blade is scarcely wider at the distance of half an inch from the point than at the point. This form permits the narrow blade to be insinuated between the conjunctiva and the insertion of the tendon with the least possible disturbance. I have found much difficulty in having scissors of this description made which, with the very narrow blades, should possess sufficient strength and perfect cutting qualities at the points. After several trials, Messrs. Meyrowitz Brothers have succeeded in producing an instrument combining these requirements.

The toothed forceps are so constructed as to combine much strength with delicacy at the working extremity. The branches are one fourth of an inch broad at their widest part, and taper but slightly until within one half inch from the toothed extremity, where they are suddenly contracted to a very narrow shaft, as fine as the most delicate iris forceps.

The hook is also quite delicate. From the stem, an inch in length, the hook extends by a short curve, at nearly a right angle, to the distance of three sixteenths of an inch. It is rounded and slightly probe-pointed at its extremity. The diameter of the hook and of the principal part of the stem is a little less than 0.5 *mm*, or of the size of No. 25 of Brown & Sharp's wire gauge.







A NEW OPERATION FOR DISTICHIASIS OR ENTROPION, WITH THE RECORD OF A FEW CASES.

By W. F. SMITH, M.D., Chicago, Ill.

(*With three illustrations.*)

AFTER long-continued inflammation of the conjunctiva, as by trachoma or persistent follicular conjunctivitis, atrophy of the inner surface of the lid (conjunctiva), including its free margin, takes place. The lashes, from lack of support and the abnormal distribution of the nutritive processes, fall towards, and curl down upon, the cornea (distichiasis). As the inner surface of the lid contracts, entropion develops. By referring to the text-books, for instance the well-known figure of Waldeyer representing the anatomy of the free margin of the lid, it will be seen readily why the lash loses its upward and outward curve, under the influence of atrophy, to assume the abnormal position spoken of. The cilia are supported by fibres of the orbicularis known as the M. Ciliaris Riolani, situated beneath the cilia and surrounding the ducts of the Meibomian glands near the lower, free margin of the lid. It is to be supposed that these fibres are partly or wholly absorbed in the progress of atrophy, while the Meibomian ducts, sweat glands, and small nutrient vessels are contracted if not almost obliterated. The under side of the lash grows with less rapidity than its upper side, and it naturally curls downwards like a wood shaving before a fire.

All of the operations for narrowing the external surface of the lid, or for excising a portion of the cartilage, or even for transplanting the ciliary margin, are liable to failure in that they do not correct the abnormal direction or curve of the lashes. These considerations suggested the idea of transplanting a narrow strip of cuticle, without pedicle, in such a manner as to supply to some extent the tissue lost by atrophy at the inner margin of the lid, and in this way lift the lashes away from the bulb. The success has been much more striking than was anticipated, for the lashes were not only lifted from the bulb, but they assumed the normal curve upwards and outwards within three weeks after the operation in all the cases about to be detailed.

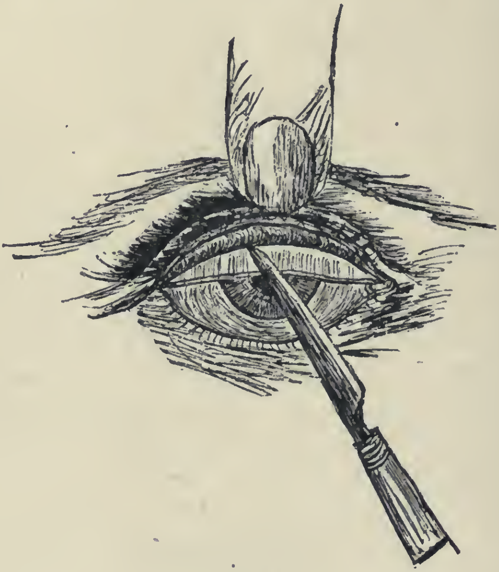


FIG. 1

Mr. Paxon presented himself for treatment Oct. 7, 1886.

Oct. 26th.—Stated that he had suffered from inflammation of the eyes since childhood. On examination the disease was easily recognized as having been true trachoma, the ravages of which were but too readily traced in an irregular corneal surface, pannus, the conjunctiva seamed with cicatrices, and entropion of the upper lids. During the last four years he had been almost continuously treated by different members of the profession in Cincinnati and in this city with more or less benefit. The present hazy condition of the cornea and pannus is evidently due to the irritation of the inverted lashes.

After some preliminary treatment I operated on the left eye in the following manner (October 25th) : Operation at residence on Dearborn Ave. Patient did not take an anæsthetic. First the lid was split in the usual manner for the operation by Arlt's method (see Fig. 1). I made the incision at a uniform depth of about 4 *mm*. It extended nearly the whole length of the lid, so as to include, rather exclude, all of the troublesome lashes. The plane of the incision was such that while it followed the inner margin of the lid almost within the conjunctiva, its bottom was about midway between the conjunctiva and cuticle, the direction being upwards and outwards nearly at a tangent to the cornea when the parts were at rest—rudely represented in Fig. 2 at *a*. I then made two parallel incisions in the skin above the margin of the lid. These incisions were about 1.5 *mm* apart, as represented in Fig. 3. The cut in the respective ends of the strip of skin made it exactly as long as the slit in the edge of the lid

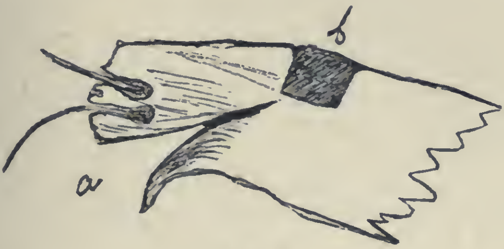


FIG. 2

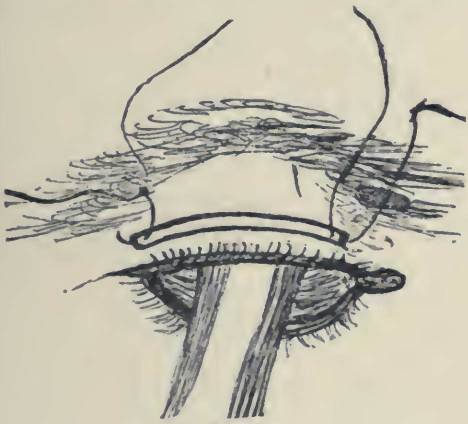


FIG. 3

previously made. Before separating the strip of skin from the underlying tissue, I passed a curved needle, armed with the finest silk, through the end of the strip from without inwards. After drawing the thread partially through, I passed the needle from the bottom of the slit in the edge of the lid, bringing it out through the skin near the canthus. This was done at both ends of the strip, as represented in Fig. 3.

By drawing the threads loosely, the loops of thread including the ends of the strip could be used in the place of forceps. Using them in this way the strip was readily separated from the underlying tissue with a sharp knife, working from the extremities towards the centre. The depth of the strip was great enough to comprise some muscular fibres. Having control of the strip by means of the threads it was easy to lift it over the lashes and adjust it within the slit without allowing it to come in contact with any other part. By simply tying the threads, the strip of skin was drawn accurately into the desired position, and one suture passed through its middle fastened it snugly in the groove. The operation was completed by stitching together the narrow slit left in the surface of the lid.

As the face, eyebrows, and conjunctiva of the patient as well as the operator's hands and instruments had been thoroughly disinfected by means of hot water, a solution (2 %) of carbolic acid, and powdered borax, I felt confident that the transplated tissue would not be lost through septic inflammation.

On the third day I removed the stitches, and found that the entire strip had become firmly united to the parts in its new position. The lashes nowhere were in contact with the cornea. I directed the use of warm water and powered borax for cleanliness more than any thing else. In ten days after the operation the lashes were not only quite above the cornea but had assumed the normal upward curve, and have maintained it since.

Ten days after the first operation (Nov. 5th) I made the same operation on the right eye of this patient. The result is similar in every respect. I saw the patient last week, Jan. 29, 1887. His eyelids do not droop in the least. The eyelashes appear as numerous as they should be ; because they are black they make a better showing than would otherwise be the case. The pannus has disappeared, but the corneal surface is still somewhat irregular. $V = \frac{20}{XL}$ r. and $V = \frac{20}{L}$ l. As far as I am able to determine, refraction seems to be emmetropic. Cylindric lenses do not improve vision ; but vision for distance is improved by the stenopaic slit. Patient considers that the improvement is still in progress.

M. Hughes, an inmate of one of the wards of the Cook County Hospital in this city, and under my service, was suffering from the effects of "wild hairs" which he had been in the habit of pulling out with a pair of forceps every few days for a number of years. There is entropion. The lashes are sparse and very delicate. There was at the time of first examination a small ulcer on left cornea. Patient said he frequently suffered from "such spots." There was no pannus. I made the operation, as above described, in his right eye, Nov. 1, 1886. Eight days after I operated on his left eye. This patient had entered the hospital for surgical care of a fractured limb, and remained some weeks after the operation on his eyes. During this time I was able to present him frequently before the class of medical students who had witnessed the operation. The excellence of the result is even better marked in this than in the first described. $V = \frac{20}{xx}$ in both eyes and he reads without difficulty.

Mr. Heartt, proprietor of a livery stable on Ogden Ave. this city, æt. thirty-six, presented himself for treatment Dec. 29, 1886. Case of trachoma. Some granueles still to be seen in the cul-de-sac of both eyes. Conjunctiva seamed with cicatrices. Distichiasis of both upper lids. Operated Dec. 30th on both eyes ; assisted by Dr. Taylor, who administered ether. The recovery was prompt and entirely satisfactory as far as the position of the lashes is concerned. The edges of the lids are even fuller than would seem normal, but I am still treating the trachoma twice per week. Patient reads without difficulty and attends to business with comfort.

One of the greatest difficulties I met with in this operation was in making the parallel incisions, viz.: getting the strip of skin of uniform breadth. Messrs. Sharp and Smith have just delivered a knife which I ordered made for the purpose. It is a double-bladed knife such as was formerly much used in microscopy. By means of a screw the distance between the blades can be regulated at will. I believe it will facilitate the operation very materially.

CASE OF TRANSPLANTATION OF THE RABBIT'S EYE, WITH SUBSEQUENT ENUCLEATION.*

By H. W. BRADFORD, M.D., Boston, Mass.

The patient was a seaman in good health, about thirty-five years of age, whose right globe had become atrophied in consequence of an injury received in early childhood. The stump was removed in the usual manner, except that a strabismus hook was passed beneath the recti muscles and a suture inserted previous to their division from the sclerotic. The atrophied globe having been drawn forward, a needle was entered through the conjunctiva close to the inner canthus, the nerve found, and a suture inserted as near the centre of its substance as possible. The nerve was divided close to the sclerotic, the stump was removed, and the slight hemorrhage resulting controlled by ice. A circular incision was made in the conjunctiva of the rabbit's eye about 5 *mm* from the cornea, the conjunctiva dissected backward, and the tendons of the recti and obliqui divided close to their insertion. The eye being now drawn outwards, the nerve was cut at about 8 *mm* from its sclerotic entrance. Albumen from a fresh egg was poured into the orbit, and the rabbit's eye also dipped in albumen previous to insertion. The suture already passed through the patient's optic nerve was drawn forward and inserted into the optic nerve of the rabbit's eye, and by means of a double slip-noose the ends of the nerves were brought into apposition. One end of the suture was cut short, and the other, which had been passed through the conjunctiva near the inner canthus, was firmly secured by means of a piece of adhesive plaster to the nose, in order to prevent its being subjected to tension. The four recti muscles were next brought into position and sutured to the subconjunctival tissue, and the conjunctiva attached by four sutures to the band of the same tissue which had been left around the cornea. The lids having been closed, iodoform was dusted over them, and a pad of absorbent cotton and flannel bandage applied. For seven days the parts were left undisturbed, no febrile disturbance or offensive odor appearing. On the seventh day, upon removal of the bandage and pad, nothing of an abnormal character was observed about the lids except a small amount of mucus gluing the lashes together. The cornea presented a slight haziness, apparently superficial ; the conjunctiva was chemosed and overlapped the cornea in all directions except externally, where the sclerotic coat was exposed for a space of 8 *mm* long and 6 *mm* wide. This condition was found to be due to the premature sloughing of the suture through the external rectus, which muscle had contracted and drawn the conjunctiva with it ; the movement of the eye was good except that divergence was imperfect. All sutures were withdrawn excepting that of the inferior rectus, which was firmly adherent. Atropine was dropped into the conjunctival sac, the eye closed, and iodoform and compress used as before. On the twelfth day after operation the patient complained of some annoyance, which was found to be due to the remaining suture having sloughed away and lodging under the lower lid. The condition of the eye at that time was as follows : Cornea hazy but somewhat less so than when previously examined ; conjunctiva well united around the cornea and to the globe ; exposed sclerotic on outer side had become covered to about half of its extent ; recti muscles working satisfactorily, with improvement in divergence. Atropine and iodoform used as previously.

---

* The report of the transplantation and the patient's condition for eighteen days following is condensed from an article in the *Bost. Med. and Surg. Jour.*, Sept. 17, 1885.

The delay in reporting the subsequent history, was due at first to the patient's absence, and afterwards to a protracted attack of iritis, which withdrew the writer from professional work.

Eighteen days after the operation the condition of the eye was as follows : Conformation and tension good ; cornea improving, and has cleared peripherally so as to allow the iris to be distinctly seen ; chemosis of the conjunctiva has disappeared, although the membrane remains congested ; exposed sclerotic on outer side of the eye practically covered by the conjunctiva ; ocular movements in all directions good.

The patient was again seen in October, when the condition of the transplanted eye was as follows : tension practically normal ; cornea showed an opaque contracted cicatrix occupying about one-fourth of its area, the remaining portion being transparent, and apparently well nourished ; pupil widely dilated, and not reacting to light ; vitreous hazy but sufficiently clear to afford a glimpse of an indistinct white spot in the region of the fundus which should be occupied by the nerve. The patient next presented himself in January, on his return from a three months' sea voyage. Inspection of the eye showed the cornea sclerosed, wrinkled, and opaque ; the entire globe presenting the general appearance of phthisis bulbi without evidence, however, of pain, inflammation, or discharge, none of which had at any time been present during the interim. The advisability of enucleation was considered at this time, but was postponed for the purpose of further observation, and was performed upon his return in the following September, the globe being found firmly adherent at all points where sutures had been used, including the nerve.

GLAUCOMA SIMPLEX (ON BOTH SIDES) IN A CHILD ELEVEN YEARS OF AGE.

Reported By R. L. RANDOLPH, M. D.,

ASSISTANT SURGEON TO THE PRESBYTERIAN EYE AND EAR HOSPITAL, BALTO., MD.

Lina G., a very intelligent mulatto girl, has noticed for more than a year that her sight has been gradually getting worse. Her father observes that she no longer recognizes small objects at a comparatively short distance. She has, on several occasions, during the past eighteen months, complained of pains in the temples and forehead, but as they were transient in character they attracted very little attention in themselves from either the child or her parents. Has seen no veil or cloud in front of objects—in other words, no "temporary obscurations"—nor has she noticed the rainbow-colored ring about a flame. Her family history gave me absolutely no clue as to the origin of her trouble. Objectively I found the following: R E V $= \frac{6}{36}$; L E $= \frac{6}{60}$; marked *plus* tension in both eyes—indeed the left eye possessed a feeling of stony hardness to the touch. The pupils, though large and somewhat sluggish, presented besides these two diagnostic points nothing marked. Narrowing of the field of vision in both eyes, more especially in the left, on the nasal side. Externally the eyes presented a perfectly normal appearance. The ophthalmoscope revealed transparent media and glaucomatous excavations in both eyes. As there was no material difference in the ophthalmoscopic appearance of the two eyes, I will simply describe one fundus. The vessels were crowded over to the nasal side of the papilla and disappeared with a sharp bend into the depth of the excavation. The veins were twisted and somewhat enlarged. The arteries were narrow, and at points near the border of the papilla pulsated very beautifully. The entire papilla presented a grayish hue, and the outer three fourths were almost perfectly white. In other points I observed nothing noteworthy in either fundus.

Prof. Chisolm, who saw the case also, tells me it is the youngest that he has ever seen. Not infrequently cases of glaucoma in very young children are seen at the hospital, but they were always complicated with hydropthalmus or keratoconus, and so, of course, must be regarded as secondary.

In a residence of a year and a half in Vienna, during the latter half of which time I served as assistant in the clinic of Prof. v. Reuss, the youngest case of glaucoma simplex (primary) that I heard of, and which I afterward saw, was in a man of twenty-five years.

Here, however, we have the process manifesting itself at the ninth year. The only parallel case that I find in the literature of the subject is that reported by Webster of New York in vol. xvi., No. xvi., of the *N. Y. Med. Record*,

Operation was advised in my case, but declined.

REPORT ON A SERIES OF FIVE HUNDRED SUCCESSIVE CASES OF ENUCLEATION OF THE EYEBALL,

COMPILED FROM THE RECORD BOOKS OF DR. KNAPP'S PRACTICE AT HEIDELBERG AND NEW YORK.*

By Dr. F. E. D'OENCH, of New York,

LATE RESIDENT ASSISTANT SURGEON TO THE N. Y. OPHTHALMIC AND AURAL INSTITUTE.

As far as I know, no report of a longer series of removals of the eyeball, such as the present, has ever been made, and as I believe that such a report might be instructive in various ways and throw some light on several disputed points, I undertook to compile it from the large material kindly put at my disposal by Dr. Knapp, to whom I herewith desire to express my sincere thanks.

The great majority, 450, of the operations herein reported were performed at the New York Ophthalmic and Aural Institute, the remaining fifty at Heidelberg. Of those done at the Institute, a certain number were performed by the assistant surgeons, Drs. Pooley, Gruening, Born, and others.

In considering first the **causes** which lead to enucleation, we may divide them in a general way into two classes, the one embracing injuries of all kinds and their consequences, and the other including tumors, the various diseases and their results, etc. Injuries may be either the direct or indirect cause of enucleation ; in the former case the damage may be too extensive to permit of the preservation of the eyeball, or an active inflammation may be set up, especially by a foreign body in the interior, necessitating the operation; in the latter case the gradual destruction of the eye is the result, this class including the large number of cases of phthisis bulbi and irido-cyclitis.

---

* Read before the section of Ophthalmology and Otology at the N. Y. Academy of Medicine, May 16, 1887.

Turning now to a closer inspection of the causes of enucleation, I find that an **injury,** either directly or indirectly, was the cause in about forty-five per cent. of all cases, 234 eyes having been enucleated on this account. The number would probably be considerably larger if the clinical history of many cases were more complete, as undoubtedly many of the cases entered as cyclitis and phthisis were the result of an injury.

The number of eyes removed immediately or shortly after the injury is comparatively small, viz., seventy, the majority of which were removed on account of the presence of a foreign body in the eye, which had either at once set up an acute inflammation, or the removal of which could not be accomplished. Not less than forty-eight eyes were enucleated on account of a foreign body in the interior, usually a chip of steel or iron, a piece of gun-cap, a bit of stone or glass, or some other small object. In eight of them an attempt at removal was made, in seven of them with the electro-magnet, in one with a hook; in this last case the eye was found to contain two foreign bodies, so that even if one of them had been extracted, there would have been but slight hope of saving the eye. In one case, in which the foreign body had entered five days previously, the magnet raised it, but failed to bring it out, on account of the plastic inflammation which had already begun to fix the foreign body in its position, showing that aside from the danger of suppuration which an infected foreign body may produce, success can attend the use of the magnet only when it is used at the earliest possible date. Two of the cases are remarkable for the long period of time the foreign body had been in the eye. In one sight had been destroyed by a chip of steel in six weeks, and the eye had then remained quiet for ten years; then followed occasional attacks of pain and inflammation, and lately photophobia and lachrymation in the other, making the removal of the injured eye necessary. In the other case a piece of guncap had entered twenty-five years previously; the eye had remained quiet during all that time, but lately had become suddenly inflamed, whereupon it was removed. In the great majority of cases, however, the foreign body had given rise to an inflammation either at once or within a few weeks or months, attended with symptoms of irritation in the other eye, so that the propriety of an enucleation could not be questioned.

As might have been expected, almost all the eyes removed on account of the presence of a foreign body in their interior belonged to persons of the male sex, only three of the forty-eight patients being females. The disproportion is not so great when the whole number of injuries is taken into account, the ratio being about five to one, 127 eyes of persons of the male sex being removed for this cause, and 25 eyes of persons of the female sex. This ratio is still further reduced when the whole number of enucleations is taken into account; of the 500 eyes removed, 365 were those of men and boys, 133 those of women and girls; in two cases the sex is not stated.

Next to injuries, the most frequent cause of enucleation were **tumors**. They were mainly of two kinds—gliomas and sarcomas. The number of eyes removed on account of epithelioma is small, and tumors of this kind almost invariably came from the surroundings of the eye, affecting the latter only. **Glioma** was the cause of removal in eighteen eases, eleven of which belonged to the male, six to the female sex; of one the sex is not mentioned. In eight the right eye was first affected, in six the left; in the remainder it is not stated what eye was affected. The age of the glioma patients varied between five months and twelve years. With only three exceptions, however, their age did not exceed four years. The time during which they had been under observation, when stated, varied between two months and a year and a half. It would be of great interest to know the subsequent fate of these patients, but for evident reasons it is difficult to obtain statistics on this point, as the children disappear from observation. That the chances of escape from death were not good, however, becomes apparent from a review of the cases in question. Five returned with a relapse from within two months to a year, so that their fate could hardly be doubtful ; in one case an orbital tumor also was found, the complete removal of which could scarcely be expected ; in another the tumor filled the whole vitreous, so that it is not improbable that some of its elements had penetrated beyond the confines of the globe ; in still another the optic nerve was affected, thus dooming the patient with almost absolute certainty ; while in still two more cases the other eye also had become affected, making death only a question of time. Thus, in ten cases, or about fifty-five per cent, it was almost certain that the patients would die at an early date, and it is not improbable that a relapse occurred in some of the cases which did not return, making the prognosis doubtful even when the tumor was removed at an early stage of its development.

The tumor which occurred most frequently in the eye was the **sarcoma**, thirty enucleations having been performed on this account. In twenty-three cases the patients were men, in only seven women, thus showing a marked disposition of the former for this affection. In fifteen cases the left eye was attacked, in seven the right, in the remainder it is not stated which eye was affected. This would seem to indicate that the left eye is more liable to be attacked than the right, an observation which I believe holds true in regard to other organs symmetrically situated. The age of the patients varied considerably, the youngest being twenty-one, and the oldest seventy-four. The former case, however, is somewhat doubtful, the tumor being situated on the surface of the eyeball, near the cornea, and being ascribed to an injury which had been received only a short time previously. Besides this there was only one other case in which the patient was less than thirty years of age, being that of a young woman of twenty-five. The great majority of cases occurred between the ages of thirty-eight and fifty, not less than eighteen, or sixty per cent., being observed during that period of life. This confirms the observation that sarcoma is rarely found in the eye before the age of forty. With the exception of two, which were leuco-sarcomas, they were all melano-sarcomas. Of the two cases of leuco-sarcoma little is known. One occurred in a man aged forty-eight, who had been treated six months previously for kerato-iritis ; the sclera was perforated at the time. The eyeball was much inflamed when removed and somewhat shrunken. The tumor sprang from the ciliary processes. The other was found in a woman, age not given, and also came from the ciliary region.

As regards the melano-sarcomas, the rapidity of their growth seems to have varied considerably. In one case the eye had been blind for twenty-eight years, and the tumor filled almost the whole of the interior, besides occupying the pupil and the upper inner part of the iris. Of course it could not be determined whether the tumor had been growing for twenty-eight years, but it certainly had existed for a long period of time. In another case sight had gradually been destroyed twelve years before ; the tumor had perforated the cornea, and had therefore probably begun to grow many years ago. The shortest period of time which elapsed between the observance of the first symptoms and the removal of the eyeball seems to have been five weeks, the patient noticing that the sight of the eye was becoming blurred. The ophthalmoscope revealed a tumor at the posterior pole, and as there was no doubt of the diagnosis, the eye was removed, although V still was $\frac{20}{40}$ at the time of the operation. On opening the eyeball a typical melano-sarcoma was found, of about the size of a large pea. There can scarcely be a more brilliant illustration of the value of the ophthalmoscope, for without its aid, what man would have dared propose the removal of such an eye ?

The tension, when recorded, was found to be increased, with the exception of one case, in which it was normal. The tumor in this instance was fairly large, occupying about one fifth of the vitreous chamber. But such an observation is exceptional, the well-known rule holding good that when detachment of the retina is complicated with increase of tension, a tumor is most likely the cause. The location of the sarcomas varied somewhat, but the favorite one was at or near the posterior pole, six being found there among the eighteen in which the location is mentioned. The ciliary region also was not infrequently the seat of the tumor, four having their origin there and extending backward. In two cases the sarcoma filled the whole interior and even extended into the orbit. Little is known of the subsequent fate of the patients. One, the young woman of twenty-five, died about a year later of metastatic sarcoma of the liver, and it is probable that the two patients in whom the tumor filled the whole eyeball did not survive long; in fact one of them had a relapse three months later. In one case, operated about seven years ago, no relapse has occurred, and the patient is still living. One died, fourteen years after the operation, of sarcoma of the liver and other organs.

Of **carcinoma**, nine cases are recorded, all being of the less malignant type of epithelioma. The youngest patient was a woman aged thirty, the oldest a man aged seventy-two. The favorite starting-point of the tumor was the lower lid, four cases being recorded in which the growth began there. In one case the tumor sprang from the conjunctiva of the globe, in another it came from the orbit, and in still another, it proved to be a cystoid carcinoma, starting from the posterior wall of the orbit. The growth of the tumors, where noted, was slow, fourteen years having elapsed in one case since the neoplasm was first observed. In two cases the removal of the eyeball, though it was intact, became necessary, as it would have been left without protection after the operation. In several cases previous attempts to remove the epithelioma by a plastic operation or electrolysis are recorded, but they proved of only temporary benefit, the removal of the eyeball finally becoming necessary.

One tumor is recorded which was an **enchondroma**, as proven by a microscopic examination made by Dr. Knapp. It occurred in a young woman aged twenty-nine, came from the orbit, and in the course of two years had slowly destroyed the eyeball. It was not connected with the bones of the orbit, and was partly hard, partly soft in consistence. It consisted of well developed hyaline cartilage tissue.

The other causes of removal of the eyeball may be summed up briefly. A **slow cyclitic process** occupies a prominent place among them, seventy-four eyes having been removed on this account, in which it is not stated what produced the cyclitis. In forty cases a **phthisical eyeball,** causing pain and irritation, was removed; in eight a **painful stump** had to be excised. **Staphylomas** were also a frequent cause for enucleation, forty-one eyes being removed on this account. Of these, sixteen were anterior staphylomas, fifteen total, and ten ciliary staphylomas. They were the result of a great variety of affections, the most frequent being blennorrhœa and injuries. Almost all the cases occurred in younger people, the oldest being fifty-five, and two-thirds of all the cases occurring in individuals thirty years or under. It may be suggested that particularly in the cases of anterior staphyloma abcision would have served the purpose better, the stump produced thereby being much more movable and the cosmetic effect decidedly better. This, no doubt, is true, but the operation, even with the modification practised by Dr. Knapp, of passing the sutures through the episcleral tissue, has not proven entirely safe, sympathetic ophthalmia developing in two cases, though the operation was carefully performed. Of course we must not conclude from this that abscision of staphyloma should be abandoned, but it certainly is not an entirely safe operation, and when in doubt what method to use enucleation should have the preference.

The **other causes** of enucleation are distributed among a great number of affections. In eight cases **absolute glaucoma** was the cause, in six **ossification** of the choroid, in five secondary **traumatic glaucoma**, in four **hæmophthalmus,** in three **megalophthalmus,** in three **choroiditis,** in two **cysts of the iris,** in two **hemorrhagic glaucoma,** in two **hydrophthalmus,** etc.

In regard to the **method of operation** little need be said.

Its first step consisted in the tenotomy of the four recti muscle, beginning at either the external or the internal rectus, and detaching the conjunctiva as close to the corneal margin as possible. After the completion of this step the eyeball was lifted out of its socket by pressing the branches of the speculum behind it, making the division of the optic nerve easier. Care was taken, however, when this manœuvre was attempted in a soft or injured eyeball, lest it burst under the pressure. Dr. Knapp lays stress on the precaution that, during all the cutting, the points of the scissors are in immediate contact with the sclerotic. The eyeball should be shelled out of Tenon's capsule, and the cellular tissue of the orbit wounded as little as possible. In this way hemorrhage and propagation of infection are best avoided.

As regards the application of a suture, I find that it was more frequently omitted than practised, the edges of the wound applying sufficiently well as a rule to make its insertion superfluous. A suture may even be a disadvantage, as in case of secondary hemorrhage it will cause retention of the blood and infiltration of the tissues, retarding the healing.

The operation was seldom attended with any accidents. Among these may be mentioned bursting of the eyeball, an event liable to occur when the cornea has been softened by a large abscess, in staphylomas or but recently-healed extensive injuries. The number of such cases is but small, and in none did unpleasant consequences follow, the removal of the eyeball being merely made more difficult thereby.

The **course of healing** was almost always favorable. In four hundred and sixty-two cases there was either no or very slight reaction, consisting of a muco-purulent discharge or slight swelling of the ocular conjunctiva, causing the patient, however, no inconvenience, and not preventing his early discharge. This usually occurred on the fifth or sixth day. In the remaining cases there was more or less reaction, consisting in swelling of the lids and conjunctiva, free discharge, formation of an abscess, fever, or secondary hemorrhage. In most of these cases, however, the eye was removed under unfavorable circumstances, or the reaction was due to some complication which had no connection with the operation.

In four cases **free suppuration** is mentioned, in two others it was moderate. In the *first*, that of a man, aged thirty-six, the eye had been destroyed ten years ago by small-pox. It had been painful several times since, but had never affected the other. On the third day, after the operation, the patient began to vomit, and swelling of the lids set in. On the fourth day three or four incisions of the upper lid were made. Hot applications were ordered, and on the eleventh day free suppuration was established. After it had subsided, the openings in the lid were stitched together, and the patient was discharged at the end of four weeks. In the *second* case, that of a young man, aged twenty-six, the shell of a pistol-ball had entered the eye five days before, totally destroying it. The shell was found lodged in the upper wall of the orbit. The lacerated lower lid was sewed up and the shrunken eyeball removed. Next day suppuration began, and two incisions were made, allowing a large quantity of pus to escape. On the fifth day an opening formed near the inner canthus, through which also pus was discharged. The suppuration then rapidly subsided and the patient was discharged on the eleventh day. In the *third* case, that of a boy aged fourteen, a nail had struck the eye the day before, producing a transverse wound through the inner half of the cornea. The anterior chamber was full of pus, only the outer edge of the iris being visible. An attempt was made to save the eye, and although it did well at first, the pain soon returned, T increased, and even perception of light was destroyed. Nine days after admission the eye was removed. Two days after the enucleation the patient complained of headache, swelling of the lids and a purulent discharge began and the temperature rose to 103.2°, and on the following day to 104.5°, when a tonsillitis was discovered. In two days this subsided and the suppuration ceased. The *fourth* case, was that of a young man aged twenty-three. In the *fifth* case, that of a man aged forty-two, the sclera of the phthisical eyeball was so much thickened, that it had to be removed piecemeal; suppuration followed, but soon subsided, the patient being discharged after eight days. In the *sixth* case, that of a woman aged thirty-eight, suppuration began soon after the removal of the eyeball, making incisions of the orbit necessary. Hot applications were made, and in two weeks the patient could be discharged.

In two cases the discharge of the patient was delayed by the **sloughing out of the centre of the stump,** without any impleasant symptoms. In four cases, one of which has been already mentioned, an abscess of the upper lid developed, making one or more incisions necessary, while in one case there was an abscess in the stump, back of the ocular conjunctiva. In five cases *fever* is mentioned, though in three of them it was only slight; in the fourth, in which the temperature rose to 105° and an abscess of the lid formed, scarlet-fever developed; while in the fifth, in which the eyeball was removed on account of an injury, the fever was probably due to the pharyngitis which set in.

Of other complications might be mentioned **secondary hemorrhage,** which is noted in twenty cases; in fifteen, however, it was slight, the hemorrhage occurring the night after the operation and not affecting the course of healing. In the remaining six cases it was more severe, but in only three it seems to have been necessary to resort to energetic measures; in two of them the hemorrhage was controlled with ice, and in the third sponges and a tampon had to be resorted to. In this last case the hemorrhage occurred on the seventh day after the removal of some suspicious ulcers in the orbit (the eye was removed on account of a melanosarcoma of the sclera); the patient became very weak, and it seems that he was a bleeder. In two other cases also there seems to have been a marked tendency to hemorrhage, the patients bleeding profusely both during and after the operation; the course of healing, however, was smooth, and they were discharged after seven days. It will thus be observed that the number of cases in which there was marked reaction from the operation is very small; the total absence of cerebral symptoms is especially noteworthy, so that it is hardly necessary to state that the operation never resulted fatally.

Until about a year ago the operation was performed without strict antiseptic precautions. The lids and surroundings were washed with ordinary water, and the operation was then performed. During the last year, however, stricter measures have been adopted. The lids are first washed with soap and water, Panas' solution is introduced into the conjunctival sac, and the edges of the lids are carefully cleansed with the same antiseptic solution. After the operation it is instilled once more, both eyes are bandaged, and the patient is sent to bed. Ten operations were performed in this manner in six months, and with the exception of some chemosis and congestion in one case and some puffiness of the lids in another, there was no reaction. General conclusions cannot be drawn from such small numbers, but in view of the good results obtained in general surgery, it is reasonable to assume that by adopting similar measures the reaction following the removal of an eyeball can be reduced to a minimum. Samelsohn, who is a believer in the microbian theory of sympathetic ophthalmia, has even endeavored to curtail the indications for enucleation by the thorough use of antiseptics in cases of extensive injury. He abscises the torn parts, disinfects the wound with a spatula dipped into a sublimate solution of 1:5,000, and thus hopes to preserve not only the shape of the eyeball, but sometimes even useful vision. Leber, on the contrary, warns against placing too great confidence in such measures, and relates a case in which, although he had abscised the prolapse of iris, thoroughly disinfected the wound and stitched the conjunctiva over it, slight sympathetic inflammation developed. I believe that the majority of oculists are not prepared to follow Samelsohn. They believe that it is better to sacrifice a hundred useless eyes than save a little sight for one at the risk of losing both.

There are some questions upon which this series of operations may cast some light, the first of which is: **Is it safe to remove an eye in which panophthalmitis has developed ?** Ever since Albr. v. Graefe warned against the removal of a suppurating eye because death followed in two of his cases, operators, swayed by the authority of his great name, have hesitated to excise such eyes for fear of like unfortunate results. But since that time surgery has made great progress, and since the introduction of antiseptics the fear of a fatal result has been much lessened, and the belief seems to be gaining ground that the danger of the operation has been overestimated, and that by observing proper precautions it may be safely done; nay, some operators, like Alt, go so far as to urge the removal of such eyes, considering the danger of their presence greater than that of excision. English surgeons do not seem to have been very much afraid of operating under such circumstances; Nettleship, in his paper on meningitis after excision of the globe, states that in England such eyes have been and are freely excised. Priestley Smith also, who had two deaths from meningitis and barely saved a third patient from a similar fate, thinks that if proper precautions are observed, the operation is not dangerous. He dusts iodoform into the wound after the bleeding has stopped, carefully watches the temperature, and if it rises decidedly syringes out the wound with a warm solution of some disinfectant. Gunn also does not think there is any danger in removing a suppurating eye, Brudenell Carter, Higgens, and Mules are opposed to an operation under these circumstances. Rolland does not hesitate to remove an eyeball after panophthalmitis has begun, but only when no cerebral symptoms have manifested themselves. He removed seventy such globes, and saw no evil results follow. Alt reports the excision of eight such eyeballs without antiseptic precautions, and had no reaction in any of them. German oculists also are beginning to ask themselves whether they have not allowed themselves to be influenced too much by Graefe's statement, and Jacobson even says that since the introduction of antiseptics there need be no fear any more of meningitis after enucleation of a panophthalmitic eye. They are, however, inclined to substitute exenteration for enucleation, of which I shall say a few words later.

What light do these statistics shed on this question? In looking over the list I find that twenty-one cases are recorded in which the eye was removed during panophthalmitis. It is true that in some cases the inflammation was only beginning, so that the danger of removal was hardly greater than in an ordinary case; in two thirds of the whole number, however, there was active suppuration, attended with more or less swelling. In all the cases but three the panophthalmitis was of traumatic origin ; in two no cause in mentioned, and in one the inflammation was supposed to have been of spontaneous origin. In two cases, the eyeball was removed on account of suppuration which had set in after extraction. In all of these cases except one the course of healing was smooth. In this one case there was great chemosis before the operation, and the cornea had been converted into a yellowish mass. The globe was enclosed in hard, lardaceous tissue, making its removal very difficult. When the sclera was incised, thin pus escaped ; the globe collapsed and had to be pulled forward with a hook. After the operation the patient had some fever and an abscess of the upper lid developed. The swelling then slowly disappeared and the result was good. In two other cases the globe was incised, permitting pus to escape, and was removed after the inflammation had somewhat subsided. In still another case the chemosis was so great that no squint-hooks could be used ; nevertheless there was no reaction. On an average it was not necessary to detain the patients longer than seven days ; the great majority were discharged after five days, and of those who remained longer the stay was lengthened in some because an attempt was first made to save the eye before enucleation was resorted to.

It would not be proper to assert that because in twenty of these twenty-one cases there was practically no reaction, it is entirely justifiable to remove a suppurating eyeball under all circumstances, but they confirm the belief that the danger of the operation has been overestimated. When the panophthalmitis is still in the incipient stage, the danger is of course slight ; but when the eyeball is full of pus and there is great swelling of the lids and chemosis, the operator may well hesitate before removing such an eye, preferring rather to afford the pus free escape by incisions and to remove the globe when the inflammation has subsided. From a theoretical point of view the excision of a suppurating eye would seem the proper measure, for as suppuration is undoubtedly due to microbes, and as they may make their way into the cranial cavity by either the optic nerve or the orbital veins, an early removal of such an eye would seem to be indicated. Deutschmann examined nine such eyes, and found the staphylococcus pyogenes aureus in all of them, and as the meningitis, when it follows an enucleation, must be due to the advent of these microbes into the cranial cavity, it would seem proper to remove the source whence they usually come, namely the suppurating eye. That suppuration of the globe is a potent cause of meningitis becomes evident from Deutschmann's and Nettleship's statistics, who found that in about one half of the number of fatal cases suppurative inflammation, either recent or of some weeks' duration, was present in the lost eye; and as the number of such eyes forms but a small portion of the total number of enucleated eyes the danger of removing them is manifestly much greater, though this does not agree with Nettleship's conclusion, who believes that the excision of a suppurating eyeball is not attended with more than the average risk of meningitis. Brückner,[1] who compiled twenty-six cases of meningitis following enucleation, of which twenty-two were fatal, and in five of which the eyeball was removed during panophthalmitis, concludes that the meningitis is the result of an infection of the wound produced by the enucleation; but by using strict antiseptic precautions, there need be no great fear of removing such eyes. From these facts we may conclude that althongh the introduction of antiseptic precautions may have sensibly diminished the danger of removing a suppurating eye, it is nevertheless an operation which is attended with some risk, requiring more than usual caution in its execution.[2]

Another question suggested by these statistics is: What effect does **enucleation** have in **preventing sympathetic ophthalmia**? Of course we must distinguish between sympathetic irritation and sympathetic ophthalmia, the former being only a combination of mainly nervous symptoms and never producing any actual changes in the eye, the latter a more or less severe inflammation. I find that seventy-two eyes were enucleated for either one cause or the other, with varying result. Fifty-one eyes were removed for merely sympathetic irritation, consisting in photophobia, lachrymation, weakness of sight, pain or redness. These symptoms always disappeared, though in some cases they had existed for a long time. In several instances the exciting eye remained quiet for a remarkably long period of time. Thus in one case forty years elapsed before any irritation resulted, in another thirty-three, in a third twenty-eight, and so on. The recovery was rapid, the patients seldom remaining in the house longer than six or seven days.

---

[1] *A. f. O.*, vol. xxxi., 4, p. 251.

[2] In the discussion Dr. Knapp stated that he had always been averse to enucleate a suppurating eye, and did it only when there was a pressing reason. His disinclination, apart from the recently published statistics, had been strengthened by a recent case, where an enucleation, after total sloughing of the cornea from hypopyon keratitis, had been urged by the patient, was performed under antiseptic precautions, yet it was followed by orbital cellulitis with cerebral symptoms which for a day had been alarming.

The cases of **genuine sympathetic ophthalmia** demand a little more attention. There are twenty-one in all, and they present a varying picture. A few were removed after the disease in the other eye had run its course, and the exciting eye was excised for the purpose of determining whether the operation would have a favorable influence upon the other and for preventing any evil effect upon a contemplated operation for improving the sight of the sympathizing eye. Four such cases are noted. In one, in which one eye had been lost by an injury many years ago, there was a slow cyclitic process going on in its fellow, accompanied with occlusion of the pupil and diminished tension. The operation apparently had no effect upon the course of the disease. In another case there was occlusion of the pupil and $V = \frac{1}{\infty}$; an iridectomy was performed a month after the enucleation, and although the new pupil almost closed up, $V = \frac{10}{200}$ when the boy was discharged. In the third case no material benefit was obtained by making an iridectomy. In the fourth case the pupil had closed and the lens become cataractous, so that several operations were required; the *final result*, however, *was very good* and useful sight obtained.

In the other cases the enucleation was performed to prevent the development of sympathetic ophthalmia, symptoms of which had shown themselves in the fellow-eye. The earliest appearance of the disease in the other eye was noted three weeks after the injury had been received, the latest twenty years after ; the latter case is remarkable as the eye had remained quiet until lately, when iritis developed in the good eye. The slightly painful stump was enucleated and the patient recovered, though he was obliged to remain in the hospital for five weeks. Another case is worthy of notice because the exciting eye was lost fourteen years ago by suppuration, indicating therefore that this is not a safeguard against sympathetic ophthalmia. Neuro-retinitis and irido-choroiditis had developed in the second eye, but what effect the treatment had, if any, is not stated ; from the fact, however, that the patient remained in the hospital only thirteen days, we may infer that the operation and treatment benefited him.

The forms of the disease most amenable to treatment were apparently the cases of simple iritis, of which six cases are recorded. The exciting eye was removed soon after the appearance of the first symptoms, and the patients were either cured or at least improved. In one of these cases V rose from $\frac{4}{200}$ to $\frac{20}{70}$, when a slight relapse occurred ; the patient seems to have been discharged soon afterwards, so that the result was probably satisfactory. One case of serous iritis is also mentioned, but nothing is known of the result. Five cases are recorded in which neuro-retinitis was observed as one of the first symptoms. One of these was reported at length in the Transactions of the International Congress of Ophthalmology. Of the other four, two were improved or cured ; in one the result is not stated, though probably favorable, as the patient remained in the house only two weeks; and in the fourth plastic iridocyclitis developed and the eye was lost. There are four cases of genuine plastic irido-cyclitis, among which the one last mentioned properly belongs, in all of which sight was ultimately destroyed. The disease took the usual course, the eye improving at times, only to lose by a relapse all it had gained, until at last not more than perception of light was left. These results conform only in part to the rules laid down by Mauthner, who states that enucleation may be performed as a prophylactic measure, that it should be done in the stage of irritation, but not in serous and plastic iritis. It is just in cases of simple plastic iritis that good results were obtained, and if Mauthner says that the enucleation may convert such an iritis into a plastic. irido-cyclitis, I fail to see the logic of his reasoning. Because in the cases he cites the latter disease developed a month or more after the operation had been performed and after the iritis had disappeared, it does not follow that the enucleation was the cause; that would be merely asserting the old fallacy of *post hoc, propter hoc*.

From the results obtained it is fair to conclude that in the majority of cases the operation exercised a beneficial influence, and although it failed to be of use in a minority, no case is recorded in which it can be said that the enucleation did harm.

As thirty cases of death are recorded after enucleation, and as the operation is not a satisfactory one for cosmetic purposes, various attempts have been made to replace it by some other operative procedure. I shall not speak of the division of the optic and ciliary nerves, as these methods were never extensively practised and have been abandoned by the majority of oculists. Neither need much be said in regard to abscision of the cornea and removal of the lens; the applicability of the method is limited, and although the cosmetic effect is excellent, the method is not entirely safe, as has been stated above. An English surgeon, Dr. Mules, lately attempted to preserve the shape of the eyeball by introducing an artificial vitreous into the scleral cavity. The mobility of the artificial eye was excellent, of course, and no untoward consequences followed. The number of such operations, however, is not large enough to justify any general conclusions, and we have yet to learn how long the glass bead in the vitreous chamber will be tolerated.

In late years exenteration in place of enucleation has been widely advocated, especially in Germany. Alfred

Graefe has been particularly active in setting forth its advantages. He prefers it in hopeless cases of injury and in established panophthalmitis, and claims that it is just as safe, if not safer, than enucleation, that it yields a better stump, and that it will be accepted where an enucleation would be refused. Fiske, in a paper on the subject, states that in many cases there is no reaction, while in others it is quite severe, being attended with chemosis, swelling of the lids, and secretion. The operation is also recommended by Deutschmann, Brückner, and in England by Mules. I have seen the operation performed only once, in the case Dr. Knapp described in the ARCH. OF OPHTH., vol. xiv., p. 309. The reaction which followed was so severe that the operation has not been attempted again since that time. The greater mobility of the stump is probably only temporary, for as the scleral tissue forming it gradually must contract, the stump will become smaller and its motion more and more restricted. The greater safety is also very doubtful, and if the advocates of the method point to the thirty deaths after enucleation, and then boast that such a result has never followed an exenteration, they should not forget that the former operation has been practised universally for a long time, and that where one eye has been removed by exenteration, hundreds have been removed by enucleation. As already stated, Fiske admits that in many cases the reaction is quite severe, and it would therefore be well to wait before accepting the claim of greater safety. Until such claim can be established, or some other better method is devised, enucleation will remain the standard operation.

COCAINE IN GLAUCOMA.

By ELIZABETH SARGENT, M.D., of San Francisco.

On the morning of June 25, 1886, I was called to see a woman seventy years old, who was suffering in the left eye from severe pain, which extended over the side of the head. About eighteen months previously the right eye had been enucleated for painful, absolute glaucoma, and in October, 1885, iridectomy had been performed to save what little sight there was in the remaining eye; glaucoma, according to the woman's story, having appeared in it after the other was enucleated.

While the iridectomy was attempted the whole atrophic iris came away; the patient, nevertheless, became blind. This took place before she came under my charge.

I found the eye of a stony hardness; no trace of the iris; the media sufficiently clear to see the characteristic excavated optic disc; no perception of light. There had been a slight catarrh of the lids, which was relieved by a mild astringent, but no pain in the eye since the operation. About ten days before the neuralgic attack came on she knocked her eye severely, and although it did not feel quite as well as previously, she said nothing about it till she sent for me on June 25th.

She would on no account consent to an enucleation, and from past experience knew that morphine did not relieve the pain, as she could not take much of it because of an idiosyncrasy. So I decided to try what cocaine would do for her, especially as the absence of the iris would preclude aggravation of the symptoms from the crowding of that structure into the angle of the interior chamber by dilatation of the pupil. I used a five-per-cent solution, one drop every five minutes, until six drops had been instilled. In twenty minutes the pain had been entirely controlled. Toward night there was some uneasiness, and the cocaine was repeated in the same way, thus insuring a comfortable night. The same was done the morning and evening of the 26th, so as to ward off a return of the trouble. By that time I was pleased to find that the eye looked clearer than before, and that the tension was almost normal. I was particulalry struck by this reduction in tension, as the most I had expected from the cocaine was its anesthetic effect. She said the eye felt lighter and more natural than it had for months.

The cocaine produced some dizziness and hallucinations, which, on the administration of small doses of an alcoholic stimulant, gradually passed off in two or three days.

Soon after recovery the woman was taken to a Home, where the eye remained comfortable and free from pain for six or seven months, when she struck that side of her face again, producing erysipelas, and had some pain in her eye, as I was told. I did not see her, as she was in a place not readily accessible and no longer under my charge.

This case seems interesting to me because of the opportunity it afforded to test the effect of cocaine on the pain and high tension in glaucoma when used without any other remedy. Should a similar case again occur, I should try a weaker solution.

TOLERANCE OF FOREIGN BODIES IN THE ORBIT AND THE EYE. A FEW CASES REPORTED IN ILLUSTRATION.

By Dr. W. W. GARDNER, of Springfield, Mass.

Case 1.—A man, of fifty years, presented himself for treatment with the following history. About six months previously, while using a machine-saw, a splinter was thrown off from the wood and penetrated the tissue between the eye and nasal side of the orbit. He removed, as he supposed, the whole of the splinter. Severe inflammation followed, which eventually yielded to time and treatment, leaving a fistulous opening, from which issued a small purulent discharge. Vision was not disturbed, and the eye appeared free from any lesion. There was some tenderness in the region of the wound, and probing the fistula revealed a foreign body. I surmised its character, and endeavored to extract it with small forceps; these failing, a resort to some dressing forceps and considerable force caused it to yield. Its length was 3 *cm.*, width at its proximal extremity ½ *cm*, tapering to 2 *mm*, thickness ½ *mm*. Its distal end appeared to have been torn from another portion deeply imbedded. Probing failed to demonstrate any more of the wood.

I theorized that its tenacious fixation, which had held it there so long and which made it so hard to remove, was in consequence of penetration of the bony wall of the orbit.

The wound was cleansed with a solution of boracic acid and dressed with adhesive plaster and a drainage-tube.

My patient did not report again until after six months. The fistulous passage had nearly healed, but an abscess had developed in the upper part of the orbit, which was pointing just below its border. The abscess was opened, and with the discharge of pus there also came forth another splinter of wood, 1½ *cm* long, which evidently was the remainder of the original stub. Cleansing the abscess and dressing it like the first time, it soon healed. Aside from some protrusion the eye at no time appeared to suffer.

The result changed my theory concerning the nature of the accident. The splinter entered the orbit following its curve, passed in back and over the eye instead of wedging itself in the bony wall. The lengthy toleration of so large a foreign body, and its happy adaptation to the curves of the eye without affecting the optic nerves or other important tissues, are, at least, novel circumstances.

CASE 2.—A gentleman came to me to have a cinder removed from the cornea. During the manipulation I discovered just beneath the eyebrow what, at first, appeared to be a horn. Permission having been given to examine it, I soon drew forth a charred round twig of hard wood, 1½ *cm* long and 3 *mm* in diameter. The patient said that eight months before, he was wounded in the eye, and was under the daily care of a physician six weeks. The inflammation and suffering had been very severe, but during a few months latterly the annoyance had been slight and limited to a trifling suppuration around the head of the stub. He had not suspected a foreign body. The course of the stub was backward into the areolar tissue of the orbit. Vision was normal.

CASE 3.—C. D., a laboring man, was working on the roof of a building a hundred feet from others who were blasting gravel. In one of the blasts a pebble stone was thrown which struck and passed through his upper eyelid and imbedded itself in the eye. A physician was called who dressed the eyelid but failed to discover the pebble. Ten days later, the patient not being able to see, reported to me. Although the foreign body was nearly one third the size of the eye, its shape and position presented so smooth a surface that the motion of the upper eyelid was not interfered with and its presence not suspected. After removal of the foreign body, recovery was good with a fair stump.

CASE 4.—A young man was wounded in the cornea by some splinters of steel. The cornea was bruised and lacerated and the ciliary region torn. Quite a large piece of steel was removed, and the eyes improved rapidly. Two weeks later, he reported for examination. Just below the cornea the tissues appeared broken and a dark discoloration indicated a foreign body. It was found to be metallic and was drawn out with the aid of a strong magnet. It measured 4 *mm.* in length and was the size of a No. 20 wire. Two years later vision $\frac{20}{20}$.

Case 5.—E. F., a boy fourteen years of age, while passing by a wood bench, struck it with a hammer. From the bench or hammer a " fire " was thrown into his eye, which passed through the cornea and lodged in the circular muscle of the iris. It was easily demonstrated, and on opening the anterior chamber for its removal, hemorrhage followed and stopped further proceedings. Another effort was not made to remove it. After a few weeks of careful nursing it encysted, and all irritation ceased. Several years afterward vision was $\frac{20}{20}$. A slight distortion of the pupil and a prominence where the steel rested, was the only evidence of the original injury.

CLINICAL COMMUNICATIONS.

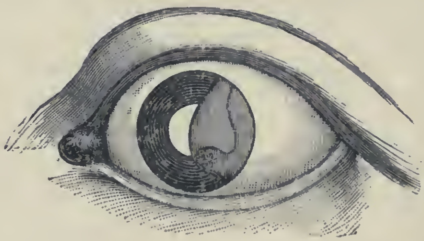
By GEO. REULING, of Baltimore.

I.—*Cyst of Iris Destroyed with the Galvano-Cautery.*

(*With a wood-cut.*)

Joseph Seipp, twenty-eight years of age, was wading, during the summer of 1879, through an almost dried-up stream, and in separating the high grasses and bullrushes to see his way clear, he was struck in his left eye by one of the sheaths. The eye became at once inflamed, and remained very irritable and painful for several weeks, but finally ceased to be troublesome, and sight was apparently undisturbed. Very gradually, however, vision became cloudy, which fact induced the patient, after nearly four years of waiting, to seek medical advice.

On the 28th of September, 1883, the examination of the eye showed at once its characteristic affection—a cyst occupying the whole outer half of the anterior chamber of the left eye. It emanated from a small cicatrix in the outer and upper sclerocorneal margin, to which a small piece of iris was adherent. From this matrix a thin blood-vessel was accompanying the inner surface of the completely transparent cyst-wall until it almost reached its floor. At this point it ended apparently with a free opening, it evidently having been ruptured, as a few particles of



coagulated blood were deposited upon the floor of the cyst. This small coagulum changed its position according to the position of the patient's head, similar to a hypopyon. The exact measurement of the cyst was 7.5 *mm* in greatest length, and 4.2 *mm* in its greatest width. The liquid contained in the cyst was perfectly clear, and showed only as a sediment the small blood-coagulum mentioned before. The iris was atrophic at the starting-point of the cyst, but showed no residue of former iritis. The crescent-shaped pupillary space reacted almost normally to light, and the lens appeared clear and slightly pushed forward and inward.

The **operation** for its removal consisted in a broad iridectomy, the incision for which was entirely made within the scleral border and immediately behind the cicatrix from which the cyst had started. The operation was not quite as simple of execution as I here described it, inasmuch as the cyst could not be removed without being pierced by the Graefe knife, so that the removal of the atrophic iris and the exceedingly fine and collapsed cyst-wall, especially around the matrix, required repeated piecemeal removals of these very fragile tissues. After having completely cleared the broad coloboma of every visible particle of cystic tissue, I finally cauterized the matrix with a pointed caustic stick, and applied a pressure bandage.

The process of healing was comparatively kind; the wound closed within twenty-four hours, and neither iritis nor serious ciliary symptoms were observed during the fifteen days the patient spent at the Institute. On his dismissal his vision had improved to nearly one half, and No. 7 Jaeger could be read with $+\frac{1}{24}$. Later I saw him from time to time, and for nearly a year I was under the firm impression of having permanently relieved him of his dangerous new formation. On the 15th of September, 1884, when I had not seen the patient for over three months, he came again, complaining of his eye, which had become exceedingly painful and nearly blind. The examination by oblique illumination revealed the presence of a new cyst starting from the same old point within the cicatrix caused by the first accident. Feeling confident that the extirpation of the cyst in the usual way would afford no permanent relief, and being anxious to save the eye if possible, I made a small incision through the matrix and immediately in front of the former incision for the iridectomy. Having introduced through this opening Liebreich's iris-forceps and pulled out the cyst *in toto*, I clipped off the latter as close as possible to the incision. I then introduced the platina needle of the galvano-cautery, and by moving it gently up and down within the narrow area of the matrix I destroyed all the tissue that I reasonably could expect to be capable of producing a new cyst. On the removal of the needle, which I had kept at white-heat and in contact with the cicatrix for about half a minute, I found that an oval defect had been caused, preventing the complete apposition of the corneo-scleral wound. I therefore united the wound by a silver suture. A pressure-bandage was applied, and strict rest enjoined. During the first night the patient complained of severe ciliary pain and copious lachrymation. After the first twenty-four hours the anterior chamber was not yet re-established and there was considerable chemosis around the wound. The wound, however, closed completely without disagreeable symptoms, for on the fourth day the suture was found lying in the fornix of the conjunctiva, with particles of exfoliated tissue resulting from the burning of the lips of the wound. The lens remained clear throughout the process of healing, and vision had again returned to nearly its former degree. The patient was dismissed twenty-one days after the operation, and was seen by me about every month for the next six months, when I could notice a steady improvement of his eye until Jaeger No. 5 could be read with $+\frac{1}{24}$.

The last time I saw the patient was fourteen months after the galvano-caustic destruction of his cyst. His eye did not show the slightest symptoms of a return of the trouble. The other eye had been free from irritation. The patient, an intelligent and prudent man, was desirous to establish a mercantile business in the West. I saw no objection to his doing so, but asked him to inform me at once if there should be a recurrence of his eye trouble. Not having heard from him since, I fairly consider his case as an instance of a permanently successful removal of a traumatic cyst of the iris.

II.—*Syphiloma at the Sella Turcica Causing Engorged Papilla and Ending in Complete Recovery.*

On the first of February last, Judge R., aged forty-six years, an ex-member of Congress and one of the most prominent lawyers of a Southern State, was brought to my office in the following condition: Left upper lid was in a state of complete ptosis, both eyeballs were considerably protruding, so that the intact lids of the right eye could not be closed completely. Every eye muscle in both eyes was either paretic or paralytic, with the exception of the external recti, which caused both eyes to occupy a divergent position in which they were almost immovable (oculomotor-paralysis). Both pupils were dilated *ad maximum*, a most singular circumstance, as usually in cases of paralysis of the third pair the dilatation of the pupil is only moderate. On questioning the patient whether atropia had been used, he answered in the negative. His facial expression was staring and reminding one of animal stupidity. His gait was staggering, his speech heavy, and his sentences frequently disconnected. The latter symptom was even more pronounced before the Judge left his home, so that his physicians expected at any moment an outbreak of acute mania. The examination of his eyes revealed the following condition: The greatly enlarged pupils completely irresponsive to light, optical media transparent and normal, mobility of the eyeballs reduced to a minimum, position of both eyeballs divergent, conjunctiva considerably hyperæmic and suffused by subconjunctival serous infiltration, as also was the orbital tissue. Vision in each eye amounted yet to $\frac{1}{4}$, field of V showing in each eye a central scotoma. On examination with the ophthalmoscope the most pronounced neuro-retinitis was observed. Both optic discs were positively globular and greatly enlarged, so as to bulge considerably above the level of the retina. The discs as well as the retinæ were dotted all over with innumerable hemorrhages, the largest ones being close to the macula lutea, without covering it however. The line of demarcation between the optic disc and retina had disappeared, and it was a source of considerable interest to have so large an amount of vision retained yet in an optic nerve and retina so thoroughly pathological in their appearance.

A prominent oculist in Washington who kept this case under the closest observation for four days, diagnosed it as neuro-retinitis morbi Brightii, and prepared the wife for a speedy fatal termination. As I could find only mucine and neither albumen nor renal casts of any description, and further, in the absence of hydropic symptoms and any heart affection, and further, in view of the immense protrusion of both optic nerves, the serous infiltration into the orbital tissue, owing evidently to stasis in the ophthalmic vein and its tributaries, I was convinced of the presence of a tumor on the base of the brain, most likely on the sella turcica, and very probably of syphilitic origin.

My treatment, therefore, consisted in the removal of two ounces of blood from each temple by Heurteloup's artificial leech, and the systematic inunction of the blue mercurial ointment in half-drachm doses into arms and legs, with the internal administration of iod. potassii in ten-grain doses three times a day, for the purpose of producing speedy action.

An improved condition of the patient set in almost with the moment treatment began. Twelve hours after the blood-letting and first inunction, the ptosis (of the left lid) had diminished, and the excruciating headaches which had existed for weeks, and which had been ineffectually combated with the strongest doses of chloral and various narcotics, had ceased for the first time. In twenty-four hours mobility of both eyes had perceptibly increased, and the infiltration of the conjunctiva and orbital tissue disappeared visibly, so that both eyeballs had perceptibly receded into their orbits. After two days the right eye had taken its central position and showed the returning activity of the internal rectus muscle, as convergence could be produced at will. The ptosis had now completely disappeared, and both lids could be closed normally over the eyeballs. With all these improvements of the external symptoms the recovery of both retinæ and optic discs held even pace. The swelling and infiltration of the disc was considerably lessened, and more than one half of the hemorrhagic spots had disappeared. As both pupils had so far remained largely dilated, I instilled a one-half-per-cent solution of eserin into each conjunctival sac. The contraction which followed this application represented the pupils at their normal size, in which condition they remained and acted normally toward light. On the fifth day the paretic condition of the eye muscles had almost disappeared, and there was never a recurrence of the much-threatened headache since the moment treatment began. These headaches had appeared daily for weeks, and had made existence almost unbearable ; they produced all the symptoms of severe brain-pressure, vomiting, comatose deliria, and complete exhaustion from agonizing pain. The mental faculties of the patient had reached their normal status, so that I felt safe in dismissing the case on the sixth day of treatment, with a letter to his physician, and with the advice to continue specific treatment and report once every week at my office for examination and further advice. The improvement in the visual power was as rapid as any of the other symptoms, so that five days after the beginning of treatment vision had improved to one half, and No. 11 Jaeger could be read with $+\frac{1}{18}$. The central scotomata appeared now as a fine haze overhanging objects in the centre of the visual field. The inunction treatment, as well as iod. potass., was continued for nearly two months with short intermissions, and at present, three months after the beginning of treatment, not a trace of the former pathological lesions can be observed. Vision is normal, as is also the action of the muscular apparatus of the eyes and eyelids. The mental capacity of the patient may be judged from the fact that in the first week of May he tried a case involving many hundred thousand dollars, in which his speech of defence lasted fully two days and was followed by the success of his client.

III.—*Granuloma Sarcomàtosum Corneæ of Seven Years' Standing.*

Herman Miller, of Uniontown, Md., (twenty-two years of age), applied to me for the removal of a growth situated at the inner margin of the cornea of his left eye. The growth was hemispherical in shape, and of the size of a small pea. It had a fleshlike granular appearance, and consisted of many little lobuli, between which a great many fine blood-vessels formed a dense network. The color of the growth was that of a deep red, and became paler on pressure ; it was sùcculent, and the epithelium was evidently thickened.

About two thirds of the tumor was firmly attached to the superficial layers of the cornea, and the balance to the superficial layers of the sclerotic. On examination the eye itself was found normal, the anterior chamber remained uninfluenced by the presence of the corneal growth, and ciliary injection existed only in its immediate surroundings. The examination of the conjunctiva did not reveal granular conjunctivitis, or any inflammatory changes. This tumor evidently owed its origin to traumatic injury, in the absence of any other more plausible cause.

The patient informed me that seven years ago a little brother of his ran a pointed stick of wood into his eye, after which considerable irritation, sensitiveness to light, and lachrymation existed, which gradually subsided, but was followed by a red spot in the place of the former injury, from which very gradually the above-described tumor developed. There was only occasionally some shooting pain, and slight lachrymation accompanying the growth. Of late the progress of the tumor was somewhat more rapid, and on various occasions small, mostly punctiforme, capillary hemorrhages made their appearance upon its surface.

As the patient desired to be relieved of the tumor, which had caused him much uneasiness during the last few weeks, I extirpated it together with the superficial layers of the cornea as far as blood-vessels would extend. After cauterizing the flat loss of corneal substance left on removal, I applied atropia-solution, and pressure bandage. The patient remained at the institution seven days, during which time I had carefully destroyed by galvanocautery every capillary vessel that made its appearance within the scar, in order to prevent a return of the growth, and finally dismissed him with a slight corneal opacity in the place of the tumor.

The growth itself appeared considerably smaller after removal, owing to the emptying of its blood-vessels. I placed at once a small particle of it under the microscope, and after tearing it with needles on the object glass in a drop of distilled water, I noticed that the structure consisted of sarcoma cells in the different states of development, and especially of large mother-cells, containing often three to four round daughter-cells with divided nuclei. The exceedingly fine and transparent connective tissue formed denser strata around the large cells, and made them appear as imbedded in capsules. There were none of the lobular formations described by Iwanoff and Berlin in such tumors, nor were tubular glands of the conjunctiva extending into the interior of the growth; a few of the latter were visible on the surface, as crypt-like excavations (Papillar-Vertiefungen).

I do not doubt that the tumor in question was a granular sarcoma (Sarcoma globocellulare mixtum), as the comparative scarcity of the multiple small round cells, and the prevalence of spindel cells in every state of development indicates the pathological substratum of mixed sarcoma.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY DURING THE THIRD QUARTER OF THE YEAR 1886.

By H. MAGNUS, Breslau ; C. HORSTMANN, Berlin ; and
A. NIEDEN, Bochum.

WITH THE CO-OPERATION OF

C. E. Fitzgerald, Dublin ; E. Marckwort and P. von Mittelstädt
Antwerp ; Dantone, Rome ; Hirschmann, Charkow ; S. M. Burnett,
Washington ; Schjötz and Ole Bull, Christiania, etc.

Translated by Dr. F. E. D'Oench, New York.

Sections I.–V. Reviewed by Prof. H. MAGNUS.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

a.—TEXT-BOOKS, MONOGRAPHS, TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS.

292. Bogajewsky. The need of medical aid among the people in diseases of the eye, and the necessity of satisfying it. Paper read at the first meeting of Russian physicians at St. Petersburg.

293. Braun. Text-book of ophthalmology. Second revised edition. Moscow, 1886, p. 121.

294. Korussewitsch. Vision of the marines of the Black Sea fleet. Medical supplement to the Morskai Sbornik (*Marine Journal*), Sept., 1886. The article has not yet been concluded.

295. Magnus. The blindness of youth. Clinico-statistical study of the forms of blindness occurring during the first 20 years of life. Wiesbaden, 1886, J. F. Bergmann.

296. Rampoldi. Contribution to the knowledge of the causes

of blindness with reference to their geographical distribution. *Ann. di Ottalm.*, 1886, Nos. 2 and 3.

MAGNUS (295) reports on 3,204 cases of binocular, incurable blindness, which occurred during the first 20 years of life. They were collected from 64 European institutes for the blind, according to a schedule prepared by himself. In the large majority of the institutes the examinations were conducted by oculists. Among the 3,204 cases 17.19 % were due to congenital blindness; 33.08 % to idiopathic diseases of the eye; 8.15 % to injuries; 33.17 % to constitutional affections. In 8.40 % the cause could not be discovered. Congenital blindness may be due to heredity; malformation of the progenitors' eyes may be transmitted either directly to their descendants, or the progenitors have healthy eyes and transmit to their children only some ocular malformation occurring in their family, or some constitutional disease of the progenitors becomes the cause of the heredity of blindness. Congenital blindness may also be due to consanguinity of the parents, but the author has well-founded doubts on this subject, and expresses his view as follows: Marriage among relatives is not a cause of disease to their children. Congenitally blind children are frequently the result of the marriage of relatives, but this is merely due to a disposition to disease common to both parents. Congenital blindness may also occur in cases in which heredity or consanguinity cannot be traced, as the result of a congenital disposition, so-called "collateral heredity"; and finally, spontaneous diseases of the eye in utero can become the cause of congenital blindness. The author carefully reviews the various forms of congenital blindness, for which we must refer to the original. The report will be of great interest in a considerable number of those cases in which congenital atrophy of the optic nerves or atrophy acquired early in youth is complicated with oxycephalia, a combination of symptoms which is but little known, but seems to occur not infrequently.

Among the forms of blindness due to idiopathic diseases of the eye blennorrhœa neonatorum is particularly discussed; its percentage is 23.50, the percentage of females being about 8 larger than that of males. Blennorrhœa was the cause of blindness in 71.99 % of all the cases in which sight had been destroyed during the first year of life. Its power to produce blindness is not equalled by any other form of disease, not even in later years; after the age of 60 glaucoma alone surpasses it. Blennorrhœa is more destructive among illegitimate than legitimate children, and seems to occur more frequently in the cities than in the country.

As regards blindness due to injury, we would like to call attention to the fact that sympathetic ophthalmia occurs much more frequently in young persons than in adults. No explanation of this fact can yet be given ; but it should warn us to remove eyes blind from an injury, especially in children, as soon as possible. Among constitutional diseases small-pox furnished a large percentage. The value of vaccination is clearly apparent from the statistics ; for the number of persons blind from small-pox is but a few per cent. in countries like Denmark, Germany, and England, where vaccination is compulsory, while it is very large in countries in which such a law does not exist ; for instance, the institutes of Austro-Hungary contain more persons blind from small-pox than from blennorrhœa, a ratio which should set the opponents of vaccination to thinking. The paper concludes with a formula for calculating the danger of becoming blind at the different periods of life.

According to RAMPOLDI (296), malaria and pellagra favor the development of diseases of the eye in persons who inhabit the lowlands of the Po surrounding the city of Pavia. Essential hemeralopia with consequent retinitis pigmentosa frequently occurs, or glaucoma, or hypopyon keratitis.

b.—STATISTICAL PAPERS.

297. DESPAGNET. Comte rendu statistique des maladies des yeux à la clinique du Dr. Galezowski du 1 Septembre, 1884–1 Septembre, 1885. Number of patients, 9,522.

298. FIEUZAL. Enumération des opérations pratiquées pendant de 3me trimestre de 1886—enumération sommaire des maladies observées pendant le 3me trimestre de 1886. *Bull. de la clin. nat. ophth. de l'hospice des quinze-vingts.*, July–Sept., 1886. Number of patients treated, 2,612 ; number of operations, 496, among them 135 cataract-extractions, 21 discissions, 38 enucleations, 64 operations on the iris, 20 on the muscles.

299. STEFFAN. Twenty-fourth annual report on Dr. Steffan's Ophthalmic Institute at Frankfort a/m, Jan., 1886.

300. TEPLJASCHIN. Short report on the eye-patients in the hospital at Glasow, district of Wjatka, from May, 1884, to Sept., 1885. *Wjestnik. ophth.*, 1886, No. 3.

STEFFAN (299) treated 6,013 eye-patients and performed 459 operations, among them 35 cataract-extractions, 33 of which were successful, 2 failures. He performed 26 iridectomies, 8 of them for optical, 5 for therapeutic purposes, 13 as a preliminary to extraction. Enucleations, 6 ; tenotomies, 16.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

GENERAL PATHOLOGY AND THERAPEUTICS.

301. CHEVALLEREAU. Nouveau mode de pansement en thérapeutique oculaire. *Rec. d'ophth.*, Aug., 1886.

302. KNAPP. On pyogenic micro-organisms. Amer. Ophth. Soc., *Med. Rec.*, Aug. 7, 1886.

303. LAGRANGE. L'opération de Badal. *Arch. d'ophth.*, vol. vi., Nos. 1–3.

304. PICQUÉ. Anomalies de développement et maladies congénitales du globe de l'œil. *Thèse de chir. de Paris*, 1886.

CHEVALLEREAU (301) advises to place gelatine tablets, containing the remedies to be employed, on the eye and fix them in position with cotton and a bandage. The tablets dissolve, producing the desired effect. Small rods of gelatine may also be introduced into the lachrymal canal.

KNAPP (302) believes that, in order to produce infection, a certain quantity of infectious material is necessary ; when it is too small, no infection takes place. Polished instruments are sufficiently disinfected by washing them in water and wiping them with clean cloths.

Badal's operation, the subject of LAGRANGE'S (303) monograph, consists in tearing out the n. infratrochlearis (n. nasalis ext.) or one of its three terminal branches respectively, and is recommended by Badal against constant ciliary pain in eye diseases of various kinds ; formerly he recommended simple stretching. The effect is said to be the greater, the less the local affection in proportion to the pain. In the part which has thus far appeared, the author, after a brief review of the history and literature of the operation, describes the anatomical conditions, the technique of the operation, and the accidents and dangers attending it. Evil results, such as follow the stretching of other nerves, hemorrhages, and softening in the central organ need not be feared. Sometimes, however, the wound suppurates, in spite of strict antiseptic precautions, and occasionally, though rarely, even gangrenous phlegmon sets in. Among five cases the author saw three of slight phlegmon. Keloid scars must be excised. He thinks the effect of the operation is due to the disruption of the sensitive root of the ciliary ganglion, or to an ascending neuritis of the torn nerves extending to the ganglion. He also attributes some influence to reflex action. According to Lagrange the operation is one of the best in ophthalmic surgery, an assertion which he tries to prove in the clinical part. He relates briefly the history of eighty-one cases and the results obtained in them. (1) In citing neuralgia (four cases), the results were insufficient and seldom permanent, similar, therefore, to those of resection and stretching of the frontal nerve. (2) In the various forms of glaucoma better results were obtained; the pain in particular disappeared, tension decreased, and vision increased even in cases in which sclerotomy and iridectomy had failed. But when the author expresses his belief that Badal's operation should first be performed in all cases of glaucoma, we are justified in not agreeing with him. (3) In acute ciliary pain, the result of traumatic irido-cyclitis, incarceration of the iris, etc., the best results were obtained. An enucleation can frequently be thereby avoided which otherwise would have become necessary. In chronic ciliary pain the results are not so good, but, nevertheless, sufficiently good to justify the attempt. v. MITTELSTÄDT.

III.—INSTRUMENTS AND REMEDIES.

a.—INSTRUMENTS AND TECHNICAL CONTRIVANCES.

305. OLIVER, C. A. New series of wools. Amer. Ophth. Soc., *Med. Rec.*, Aug. 7, 1886. All of the colors are of the same relative intensity.

306. PANAS. Nouvelle seringue pour le lavage intraoculaire. *Arch. d'ophth.*, vol. vi., No. 5.

Luër has designed a syringe according to the ideas of PANAS (306) for washing out the anterior chamber. It is made of glass and hard rubber, capable of resisting the action of mercury, prevents the entrance of air-bubbles and the contamination of the liquid through the piston, which is wrapped around with asbestos, and is free from fat, and also permits of regulating the pressure. The shape is that of a large Anel syringe, the canula, bent and flattened in front, has at its lower end on both sides a solid projection, so that the instrument can be firmly grasped.

v. MITTELSTÄDT.

b.—REMEDIES.

307. COGGINS. Protracted action of hydrobromate of homatropine in spasm of the accommodation. *Amer. Journ. Ophth.*, July, 1886. The complete paralysis of accommodation lasted four days after the instillation of two drops of a solution of homatropine of 1:60.

308. LANG and BARRETT. The action of myotics on accommodation. *Ophth. Hosp. Rep.*, vol. xi., July, 1886.

309. RAMPOLDI. Experiments on the physiological action of jaborine on the eye. *Ann. di Ottalm.*, 1886, Nos. 1 and 2.

310. TROUSSEAU. Note sur le santonate d'atropine. *Bull. de la clin. nat. ophth. de l'hosp. des quinze-vingts.*, vol. iv., No. 3.

311. DE WECKER. Eserine injection and eserine bandage. Congr. de la soc. franç. d'ophth., *Prog méd.*, May 22, 1886.

RAMPOLDI (309) has made the following observations on the action of jaborine: when introduced into the conjunctival sac it enters the anterior chamber by osmosis, and produces medium dilatation of the pupil without affecting the accommodation. The dilatation of the pupil is probably due to paralysis of the oculomotor nerve. Mixed with pilocarpine it preserves its mydriatic action, although the myotic action of the pilocarpine is first produced; it diminishes the myotic action of the latter drug, as well as its influence on the secretion of the saliva and perspiration.

TROUSSEAU (310) found that santonate of atropine does not irritate the conjunctival sac, and has about the same effect as the sulphate. He also claims that its stability is greater.

WECKER (311) washes out the anterior chamber with eserine—0.25 % salicylate of eserine: 4 % boiled solution of boracic acid—by lifting the corneal flap with a capsule-forceps. Then he applies a boracic-acid bandage which he has previously moistened with a ½ % solution of eserine.

IV.—ANATOMY.

GENERAL AND COMPARATIVE ANATOMY; IRIS.

312. RADZISZEWSKI. Observation d'anophthalmie avec hernies bilatérales congenitales du cerveau. *Rec. d'ophth.*, Aug., 1886, No. 8.

In a child two months old, RADZISZEWSKI (312) found the orbital cavities entirely empty, lined with normal mucous membrane and palpable to the optic foramen. In both fissuræ orbitales inferiores he observed an unchanging, white, incompressible tumor covered with conjunctiva, which on incision proved to be a cerebral hernia.

313. HAENSELL. Le microtome et ses applications à l'anatomie de l'œil. *Bull. de la clin. nat. ophth. de l'hosp. des quinze-vingts.*, July–Sept., 1886.

314. DOSTOJEWSKI. Contribution to the question of the existence of a muscle dilating the pupil in mammals. *Wratsch*, 1886, No. 36.

DOSTOJEWSKI (314) examined a large number of thin sections of the iris of man and various animals, which led him to the following conclusions : (1) The membrana Bruchii auctorum is not a transparent membrane free from nuclei, but consists of peculiar fibres, between which are embedded oblong nuclei. (2) The nuclei correspond to cells possessing all the attributes of smooth muscular fibres and not differing from them morphologically in any respect. (3) These fibres are contained only in the posterior limiting layer. The dilatator is arranged in radiating striæ extending from the periphery to the sphincter, into which it merges, spreading out like a fan. The dilatator is very clearly defined in phoca vitulina and lutra vulgaris, where it and the sphincter form the whole mass of the iris. The fibres are almost entirely absent. In ruminants and solipeds the mass of fibres containing the muscles is better developed, while the muscles themselves are weaker. The irides of man, the baboon, mandril, and macacus occupy a position between these two groups. In the lion and leopard the dilatator is well developed. HIRSCHMANN.

V.—PHYSIOLOGY.

a.—GENERAL AND COMPARATIVE PHYSIOLOGY.

315. LANG and BARRETT. The refractive character of the eyes of mammalia. *Royal London Ophth. Hosp. Rep.*, vol. xi., July, 1886.

LANG and BARRETT (315) have examined the refraction of the eyes of various animals. Of 52 rabbits 36 were hyperopic and astigmatic. In the astigmatic eyes the horizontal meridian was generally the least curved. The power of accommodation seems to be very feeble in these animals. In guinea-pigs one eye was hyperopic, sixteen were hyperopic and astigmatic, three myopic and astigmatic, two had mixed astigmatism. The horizontal meridian had the least degree of curvature ; as in rabbits, there was no latent hyperopia. The eyes of mice are generally hyperopic. Eight rats had hypermetropia, three H with astigmatism, one a low degree of myopia, and one mixed astigmatism. The horizontal meridian had the least degree of curvature. Nine cows had hyperopia, four H with astigmatism, one a low degree of myopia. Cats are generally hyperopic, dogs slightly hyperopic or myopic.

316. BELJARMINOW. Application of the graphic method to investigation of the intraocular pressure. *Russkaya med.*, Nos. 21–23. Dissertation 1886, St. Petersburg.

317. CHARPENTIER. Expériences sur la marche de l'adaptation rétinienne. *Arch. d'ophth.*, vol. vi., July, Aug., 1886.

318. DU BOIS-REYMOND. Visual unity and the smallest visual angle. *Arch. f. Ophth.*, vol. xxxii., 3.

319. DONDERS. On stereoscopy by difference in colors. *XVIIIth Meeting of the Ophth. Soc. at Heidelberg*, 1886, p. 82.

320. EXNER. On aniso-dioptric cylinders. *XVIIIth Meeting of the Ophth. Soc. at Heidelberg*, 1886, p. 49.

321. FÊRE. Influences dynamogènes des excitations visuelles. *Soc. de biol.* , *séance* July 24, 1886.

322. KAHN. Étude clinique sur le champ de fixation monoculaire. *Arch. d'ophth.*, vol. vi., No. 5, 1886. *Thèse de Paris*, 1886.

323. KOLLER. A peculiar kind of dioptric images. A contribution to the theory of cylindrical lenses. *Arch. f. Ophth.*, vol. xxxii., 3.

324. PHILIPSEN. Undersögelsen af fiets klarhedssans. *Hospitalstidende*, Nos. 33 and 34.

The somewhat complicated apparatus of BELJARMINOW (316) consists of a combination of Schulten's manometer with a photographic apparatus. Between the manometer and the canula, which is introduced into the eye to be examined, there is a tube filled with a decoction of sandal, or brazil-wood, or campeche wood, and containing an air-bubble, the position of which is affected by the intraocular pressure. The movements of the air-bubble are photographed as a dark curve upon a strip of paper revolving with a speed which can be regulated. The details cannot be related in a review.

The apparatus makes it possible to obtain objective and accurate curves of the temporal dependence of the intraocular pressure on various, even physiological, influences—for instance, pulse, respiration, etc. The author has made examinations of twenty-seven cats'-eyes (seventeen animals), and obtained the following results : (1) There is no difference between the pressure in the anterior chamber and in the vitreous. (2) The curves of the intraocular pressure and that in the blood-vessels are the same only when no influence upon the vasomotor nerves of the eye (sympathetic, fifth nerve) has been exercised (in stronger or weaker action of the heart, respiration, engorgement of the blood-vessels and blood-letting, checked outflow, contractions of the muscles, etc.). (3) When the changes in the blood pressure depend upon causes which at the same time change the tonus of the ocular blood-vessels (irritation of the central end of the sciatic, plexus brachialis, etc.), the increase of the intraocular pressure occurs later and more slowly, the maximum lasts longer, and the return to the normal is slower than the same phases of the blood pressure. (4) The parallelism is still more disturbed when the vasomotors of the eye alone are irritated (irritation of the sympathetic, the ganglion supremum, the fifth nerve, in local application of nicotine, eserine, nitrate of silver, etc.). (5) Irritation of the cephalic end of the sympathetic produces a typical curve : a rapid increase, followed by a rapid decrease. From the beginning of the irritation to the commencement of the increase, 0.58 seconds elapsed on an average. (6) Irritation of Gasser's ganglion produces various curves, according to the point at which the irritation takes place. (7) Intracranial irritation of the oculomotor nerve produces a brief slight increase of the intraocular pressure, which returns to the normal as soon as the irritation ceases. (8) There is no constant causal connection between the movements of the pupil and the intraocular pressure ; dilatation as well as contraction of the pupil may be accompanied with increase or diminution of the intraocular pressure. (9) The normal differences in pressure due to the respiration do not exceed 1–2 *mm* pressure of mercury. In a forcible expiration the pressure increases to 30 *mm ;* in a deep inspiration it falls 3–8 *mm* below the normal. (10) The differences due to the pulse usually amount to ½–2 *mm ;* when the intraocular tension is great the difference is also greater, and may reach 3–5 *mm.* The author thinks that the method may also be used in determining the pressure in the cranium, the bones, the uterus, etc.

HIRSCHMANN.

CHARPENTIER (317) has found, as Aubert did before him, that the sensibility to light at first rapidly increases in the dark, but then more and more slowly. It is of practical importance to observe that after a stay of fifteen to twenty minutes in the dark the sensibility to light is 150–200 times greater than in a room under ordinary illumination. V. MITTELSTÄDT.

KAHN (322) reports the results of his investigations of the field of fixation, made at Landolt's clinic and according to his method (*cf. Arch. d'ophth.*, vol. i., No. 7, Dec., 1881, p. 586), with a review of 45 cases operated for strabismus. The investigations are on eyes with or without anomalies of refraction, strabismus, paralysis, take into consideration the relation of convergence to the field of fixation, and show the influence of advancement and tenotomy on the former.

b.—IRIS AND ACCOMMODATION.

325. BUCHHOLZ. The effect of a series of physical and chemical influences on the sphincter of the iris. *Inaug. Diss.*, Halle, 1886.

c.—RETINA AND CENTRAL ORGAN.

326. V. GUDDEN. The question of localizing the functions of the cortex of the cerebrum. *Zeitsch. f. Psych.*, vol. xlii. Gudden removed one or both eyes of new-born animals, and subsequently found no atrophy of the cortex of the occipital lobe. This fact he utilizes in denying the existence of Munk's visual centre.

d.—COLORS.

327. CHARPENTIER. Faits complémentaires rélatives à l'intensité des sensations lumineuses. *Arch. d'ophth.*, vol. vi., No. 4.

328. DOBROWOLSKY. The sensibility of the normal eye for shades of color in the periphery of the retina. *Wöchentl. klin. Ztg.*, 1886, Nos. 21 and 22.

329. GLAN. A fundamental law in regard to complementary colors. *Arch. f. d. ges. Physiol.*, vol. xxxix., 1.

As CHARPENTIER (327) has shown in a previous paper the apparent brightness of the more refrangible colors diminishes less in decreasing illumination than that of the less refrangible. The author tested with his photometer the influence which diminution of the size of the colored object or its retinal image respectively has upon the apparent intensity of the color. Green, red, blue, and yellow may seem equally bright when their retinal image is of a certain size ; but this equality disappears when the size of the retinal image decreases, the diminution in brightness being most marked in the more refrangible colors, while the decrease in brightness due to diminishing the illumination affects the less refrangible colors more.

DOBROWOLSKY (328) found, as König and Dieterici did, that the parts of the spectrum affecting his eye most were near the lines D, F, and G. He obtained the following results : The sensibility for differences in the shades of color is greatest for all colors of the spectrum at the centre, and gradually diminishes towards the periphery until it entirely disappears. Even 1° only to one side of the point of fixation, the sensibility is perceptibly less. The loss of sensibility occurs sooner (*i. e.*, less peripherically) in colors the perceptibility of which at the centre is less. The boundary line of red, for instance, lies nearest the centre, that of green (the centre is more sensitive to green than red) more peripheric. Red is not perceived beyond 50° on the inner half of the retina and 35° on the outer half, green not beyond 80° and 50° respectively, blue and yellow not beyond 90° and 65° respectively.

According to GLAN (329) the intensity of all complementary colors, which when combined produce the same quantity of white, is the same for all in the sensitive layer of the macula lutea.

Sections VI.–XI. reviewed by Dr. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

330. H. COHN. New examinations of the eyes of watchmakers. *Tagebl. d. Naturforscher-Versamml. zu Berlin*, 1886., p. 391.

331. KNIES, M. Myopia and its treatment. *Bericht d. Ophth. Ges. zu Heidelberg*, 1886, p. 26, and *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 3, p. 236.

332. MARTIN. Études sur les contractions astigmatiques du muscle ciliaire. *Ann. d'ocul.*, vol. xcvi., p. 1.

333. NETTLESHIP. Myopia from childhood. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 73.

334. SCHNELLER. The origin and development of myopia. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 3, p. 245. *Tageblatt d. Naturforscher-Versamml. zu Berlin*, 1886, p. 390.

335. WEISS, L. The influence of tension of the eyelids on the curvature of the cornea and thus upon the refraction of the eye. *Bericht d. Ophth. Ges. zu Heidelberg*, 1886, p, 76 (*v.* these ARCH., vol. xvii., p. 63, Ger. Ed.).

MARTIN (332) discusses partial contraction of the ciliary muscle, which corrects corneal astigmatism. There are two kinds: (1) one which remains when the correcting glass is placed before the eye, and (2) one which disappears when this is done.

MARCKWORT.

VII.—LIDS.

336. DAGUILLON. Eczéma palpébral à la suite de l'opération de la cataracte. *Bull. de la clin. nat. ophth.*, vol. iv., 3, p. 132.

337. DUMONT. Corps étrangers du cul-de-sac de la paupière supérieure droite. Iridochorioidite. *Bull de la clin. nat. ophth.*, vol. iv., 3, p. 137.

338. GILMORE, A. P. Symblepharon of the lower lid. *Chicago Med. Jour. and Exam.*, May, 1886.

339. Griffith, A. H. Syphilitic lesions of the eyelids. *Med. Chron.*, June, 1886, p. 193.

340. RICHET. Ectropion cicatriciel de la paupière supérieure droite ; blépharorrhaphie ; guérison. *Rec. d'ophth.*, 1886, No. 9, p. 517.

341. SCHÖBL. Chancroid of the lid of lymphoid origin. *Tagebl. d.* 59. *Naturforscher-Versamml. zu Berlin,* 1886, p. 389 (*v.* these ARCH., vol. xvii., p. 215, Ger. Ed.).

DUMONT (337) saw iridochoroiditis develop in the eye of a man suffering with arthritis, five days after a grain of oats had lodged in the upper fornix. The foreign body was removed and the patient soon recovered under proper treatment.

v. MITTELSTÄDT.

GRIFFITH (339) describes 21 cases of ulceration of the lids, not only due to primary chancre or secondary or tertiary affections, but also the conditions closely resembling primary chancre, but not accompanied with undoubted syphilitic symptoms. In nine of these cases primary infection had taken place ; the ulcer was indurated, and the lymph glands were swollen. The ulcer was always situated near the margin of the lid and extended into the mucous membrane ; in only one case it was found on the inner surface of the upper lid.

RICHET (340) publishes a paper on the operation of cicatricial ectropium of the upper lid, and calls particular attention to the necessity of performing blepharoraphia at the same time.

MARCKWORT.

VIII.—LACHRYMAL APPARATUS.

343. ARMAIGNAC, H. Dacryoadénite aiguë terminée par suppuration. *Rev. clin. d'ocul.*, 1886, No. 7, p. 156.

344. BOCK, E. Contributión to the pathological anatomy of the caruncle. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p, 487.

345. GALEZOWSKI. Inflammation des deux glandes lacrymales. *Rec. d'ophth.*, 1886, No. 7, p. 415. Description of a case.

346. PETROLACCI, F. De l'epiphora ataxique. *Thèse de Montpellier*, 1886.

ARMAIGNAC (343) observed acute inflammation of the lachrymal gland from its beginning, when it was still possible to feel the inflamed gland and thus make a correct diagnosis of this rare affection. As soon as fluctuation was noticed, an incision was made and the pus allowed to escape. The wound, which soon discharged a clear, lemon-colored liquid, healed rapidly, but the swelling of the gland lasted several weeks. v. MITTELSTÄDT.

BOCK (344) removed from the lachyrmal caruncle of the left eye of a student a tumor the size of a pea, which he considered a hyperplasia of that organ ; it was remarkable for the development of very vascular connective tissue and a few small lobes of fat.

IX.—MUSCLES AND NERVES.

347. CANT, W. J. Paralysis of external recti. *Ophth. Soc. Unit. Kingd.*, July 2, 1886.

348. GRAEFE, A. Contributions to the knowledge of the influences active in developing and checking strabotic deviations, with especial consideration of hyperopic strabismus and muscular asthenopia. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., p. 223.

349. KALT, E. Recherches anatomiques et physiologiques sur les opérations du strabisme. *Arch. d'ophth.*, vol. vi., 4, p. 323, and No. 5, p. 430.

350. KNAPP, H. Advancement of Tenon's capsule in strabismus. *Amer. Ophth. Soc.*, July 21–22, 1886. Recommends Wecker's operation from personal experience.

351. Mauthner, L. The non-nuclear paralyses of the ocular muscles. Wiesbaden, 1886, J. F. Bergmann.

352. Nettleship, E. Unsymmetrical nystagmus. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 76.

353. Salterain. De l'électricité en thérapeutique oculaire. *Rec. d'ophth.*, 1886, p. 544.

354. Theobald, S. The amblyopia of squinting eyes ; is it the determining cause or a consequence of the squint ? *Amer. Ophth. Soc.*, July 21–22, 1886.

355. Uhthoff, W. Ophthalmoplegia externa. *Tagebl. d. Naturforscher-Versamml. zu Berlin*, 1886, p. 155 (*v.* these Arch., vol. xvii., p. 211, Ger. Ed.).

Cant (347) observed in a man aged sixty-three complete paralysis of both external recti with diplopia, simultaneously with neuritis and headache. His condition improved after using iodide of potassium.

A Graefe (348) believes that the ultimate cause of typical convergent strabismus is abnormal passive shortening of the internal rectus. Such a result is produced when powerful active contraction is demanded, and as hyperopia causes this increased contractile shortening in these cases in which the proper relation between accommodation and convergence is not established, this anomaly of refraction, in accordance with Donders' theory, therefore becomes the prime cause of the development of typical convergent strabismus.

Kalt (349) studied the changes produced in the relation of the muscles to the eyeball by the advancement and tenotomy of the muscles, as well as of advancement of Tenon's capsule, in sixteen large dogs (weighing eighty to ninety pounds), as the conditions here resemble those in man. He performed the operations named, and at various times afterwards made an anatomical examination. For details and illustrations *v.* the original. It is worthy of note that after simple division the tendon loses its character and is converted into a small fibrous stump, which attaches itself to the sclera mainly through Tenon's capsule and its sheaths surrounding the muscles, while the other adhesions are much weaker, but may extend far backward between the muscle and sclera, even to the entrance of the optic nerve. As in advancement the union between muscle and sclera is brought about through Tenon's capsule, it is necessary to pass the needles through the latter as far back as possible, to increase the effect and prevent the sutures from tearing out. If this takes place, the newly formed tendinous tissue attaches itself close to the corneal margin, but is very much elongated, the action of the muscle being diminished instead of increased. The advancement of the capsule can be demonstrated anatomically, a fibrous band being found which connects the muscle with the circumcorneal tissue and is shorter than the tendon, which may be folded. If the leaf of Tenon's capsule lying under the tendon be seized, the latter can easily be drawn forward. v. MITTELSTÄDT.

MAUTHNER (351) discusses, in the thirteenth number of his ophthalmological lectures, the paralyses of the ocular muscles not of nuclear origin. He first treats of intracranial, cerebral, cortical, and fascicular paralyses, then intracranial paralyses located at the base. To the latter class belong the relapsing paralysis of the oculomotor nerve, the binocular, curable, total paralysis of the ocular muscles, the binocular paralysis of one motor nerve, the one-sided progressive paralysis of the cerebral nerves, the binocular progressive paralysis of the cerebral nerves, and the paralysis of the oculomotor nerve accompanied with contra-lateral hemiplegia. Orbital paralyses are due to inflammation of the retro-ocular tissue, to periostitis of the orbit, or tumors of the latter. The peripheric paralyses may be due to syphilis, tuberculosis, diphtheria, diabetes mellitus, acute rheumatism of the joints, toxic influences, and injuries.

SALTERAIN (353) reports a case of right-sided spasm of the orbicularis, cause unknown ; the constant current made it worse, the induced better. He also reports a case of binocular hysterical amblyopia, which he cured in three days with atropine, iodide of potassium, and the constant current. MARCKWORT.

X.—ORBIT AND NEIGHBORING CAVITIES.

356. CARL, DUKE IN BAVARIA. Communication of a case of orbital tumor. *Wiener med. Presse*, 1886.

357. DAVIDSON, DYSE. Meningitis after enucleation. *Ophth. Soc. Unit. Kingd.*, June 8, 1886.

358. DEEREN. Exophthalmie double. *Rec. d'ophth.*, 1886, No. 6, p. 337.

359. GALEZOWSKI. Exophthalmie monoculaire avec amaurose sans lésion ophthalmoscopique. *Rec. d'ophth.*, 1886, No. 9, p. 513.

360. HAASE. Pulsating exophthalmus of the right eye, cured by ligating the common carotid. *Arch. f. Augenhk.*, vol. xvii., p. 25.

361. MAGNUS, H. Exophthalmus and diplopia due to empyema of the right frontal sinus. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 494.

362. RENTON, J. E. Notes on cases of cerebral abscess subsequent to orbital periostitis. *Ophth. Rev.*, vol. v., Nos. 57 and 58, p. 206.

363. SNELL, S. Case of orbital nævi treated by electrolysis. *The Lancet*, July, 1886, p. 163.

364. WIESNER, B. The lymphangioma of the orbit. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 2, p. 205.

CARL, DUKE IN BAVARIA (356) observed at the upper inner angle of the left orbit a tumor which had existed six years, and after an injury received two years ago had grown to the size of a hazel-nut, and was of bony hardness. The eye, possessing perfectly good sight, was dislocated outwards, downward, and forward ; its mobility was somewhat limited. After breaking the bony shell a yellowish substance escaped. As the secretion did not cease, the bony projection was entirely chiselled away. The patient rapidly recovered, and only slight deviation of the globe and diplopia remained.

DAVIDSON (357) enucleated an eye under antiseptic precautions three years after an injury, on account of painfulness. Meningitis began twenty-four hours later, and the patient died after three days. The autopsy showed meningitis and catarrhal inflammation of the uterus. Davidson makes the bold assumption that the pyæmic infection had its source in the uterus.

DEEREN (358) publishes a case of lateral exophthalmus, which he attributes to a local acute meningitis. MARCKWORT.

GALEZOWSKI (359) reports a case of unilateral exophthalmus with amaurosis, without any ophthalmoscopic changes. As iodide of potash occasionally had a good effect, he thinks the affection may have been due to a syphilitic exostosis at the optic foramen.

MARCKWORT.

The case of MAGNUS (361) was that of a woman aged sixty-three, in whom exophthalmus combined with diplopia had developed, in consequence of empyema of the right frontal sinus. After chiselling out a piece of the somewhat bulging wall of the frontal sinus of about the size of a silver quarter, a large quantity of pus escaped. The mucous membrane lining the sinus was scraped off, the cavity syringed out with a solution of carbolic acid, and a tampon of iodoform gauze inserted. The patient made a rapid recovery, and the exophthalmus and diplopia disappeared.

RENTON (362) observed in a boy aged twelve an abscess of the right frontal lobe, due to periostitis and necrosis of the roof of the right orbit.

WIESNER (364) publishes a case of lymphangioma of the orbit, in which the clinical diagnosis of fibroma had been made. The characteristics of the cavernous lymphangioma were first revealed under the microscope. These tumors are due to the presence of embryonic cellular tissue, and differ from typical angioma by the absence of the characteristic increase and decrease in size.

XI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

365. Andrews. The frequent instillation of a two-per-cent. solution of nitrate of silver in purulent ophthalmia. *Amer. Ophth. Soc.*, July 21–22, 1886.

366. COUTURIER. De l'ophthalmie phlycténulaire. *Prog. méd.*, 1886, No. 34, p. 699.

367. DOBROTWORSKY. The development of trachoma among soldiers, dependent upon their quarters. *Wojeno-sanit. Djelo*, 1886, No. 30.

368. FRYER. The use of hot water in some of the corneal and conjunctival inflammations. *Amer. Ophth. Soc.*, July 21–22. 1886.

369. ISKERSKY. The prevention of trachoma among soldiers. *Wojeno Med. Jour.*, April, 1886.

370. MINOR, JAS. Boric-acid powder in the treatment of granular lids. *N. Y. Med. Jour.*, vol. xliv., No. 4, p. 122.

371. RODIONOW. The etiology of phlyctenular conjunctivitis. *Wojeno-sanit. Djelo*, 1886, No. 35.

372. STÖLTING. Tuberculosis of the conjunctiva. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 3, p. 225.

373. ZIEMINSKI. De l'ophthalmie croupale, quelques remarques sur la scrofulose en général et les scrofulides de l'appareil visuel. *Rec. d'ophth.*, 1886, No. 9, p. 529.

ANDREWS (365) instils a two-per-cent. solution of nitrate of silver four or five times daily in purulent ophthalmia.

DOBROTWORSKY (367) concludes from his observations, which he continued in two regiments for several years, that the living together of many soldiers, even in large, airy quarters, or in camp, in large barracks, contributes much to the development and aggravation of trachoma and acute catarrhs. By putting a few soldiers together, even into small rooms, the number of affections is much diminished, even under unfavorable circumstances, such as dampness or small cubic contents of the room.
HIRSCHMANN.

FRYER (368) recommends hot water, as hot as it can be borne.

ISKERSKY (369) makes the following assertions in his voluminous, somewhat polemic, paper: (1) Trachoma is the most obstinate, widespread disease among our soldiers; (2) it is infectious, and (3) it spreads through infection, never spontaneously; (4) it is introduced by recruits and imparted to the soldiers, who in turn spread it among the population. The following measures should therefore be adopted to prevent it: (1) Men affected with trachoma should not be accepted as soldiers; (2) those already in service should be completely isolated. HIRSCHMANN.

RODIONOW (371) observed in the otherwise healthy soldiers of the 12th grenadier regiment, while in camp, an epidemic of phlyctenulæ after heavy rains. He supposes that the development of a specific phlyctenula-bacterium may be the cause of the epidemic. HIRSCHMANN.

STÖLTING (372) reports that in three cases of tuberculosis of the conjunctiva, in which the presence of tubercle bacilli was proven, the tuberculous masses were removed and the base was cauterized with a sharp stick of lapis purus or the thermo-cautery wherever there were any suspicious points. Recovery ensued in all cases, in one of them not until after repeated applications of the method.

According to ZIEMINSKI (373) croupous conjunctivitis is a complication which develops in the course of an inflammation of the conjunctiva. It complicates purulent as well as conjunctivitis of scrofulous origin. MARCKWORT.

374. BEHME. The application of the galvano-cautery in a beginning partial staphyloma. *Inaug. Diss.*, Greifswald. 1886.

375. BOCK, E. Contribution to the pathological anatomy of the cornea. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 443.

376. Brailey, W. Interstitial keratitis. *Ophth. Soc. Unit. Kingd.*, July 2, 1886.

377. Brugger, Richard. An anatomical contribution to the knowledge of keratitis bullosa. *Inaug. Diss.*, Munich, 1886.

378. Goldzieher. The galvano-cautery in diseases of the eye. *Wiener med. Presse*, 1886, Nos. 23–26.

379. Grossmann, L. Galvano-cautery as a powerful antiseptic in destructive corneal processes. *Wiener med. Presse*, 1886, Nos. 25, 27, and 28.

380. Krüger. The treatment of the serpent ulcer of the cornea with the glowing iron. *Inaug. Diss.*, Kiel, 1886.

381. Schöbl. A subepithelial carcinoma of the cornea. *Tagebl. d.* 59. *Naturforscher-Versamml. zu Berlin*, 1886, p. 389 (*v.* these Arch., vol. xvii., p. 215, Ger. Ed.).

Behme (374) recommends the galvano-cautery in beginning partial staphyloma at the point of perforation of the cornea.

Bock (375) reports a peculiar case of formation of vesicles on the cornea.

Brailey (376) describes a case of interstitial keratitis, in which he found a number of grayish-white nodules in the cornea, which he considers tuberculous.

Brugger (377) examined a case of marked keratitis bullosa in absolute glaucoma. On the cornea were one large and several small vesicles, situated in or under the epithelium. The smaller ones were produced by the destruction of single epithelial cells, the larger ones by the confluence of several smaller ones. Bowman's membrane was perforated at points corresponding to the vesicles, the corneal parenchyma was infiltrated and loosened, and the epithelium of Descemet's membrane in process of destruction. The vesicles are the result of destruction of the epithelial cells, not of the swelling and dilatation of the intercellular spaces by the œdema of the cornea.

Goldzieher (378) uses the galvano-cautery in all kinds of corneal ulcers, in follicular infiltration of the conjunctiva, in trachoma and trachomatous pannus.

Grossmann (379) recommends the galvano-caustic treatment in traumatic keratitis, serpent ulcer, rodent ulcer, scrofulous ulcers, pannus with ulcers, and in frenum phlyctænulare. He uses a delicate platinum loop, which he brings only to a red heat. In deep ulcers he produces a perforation with the loop. The after-treatment consists in the use of atropine, eserine, insufflation of iodoform, and a protective bandage.

KRÜGER (380) reports that Völkers uses a simple glowing iron as a cautery in serpent ulcer.

382. ROBINOWITSCH, H. A case of cysticercus in the anterior chamber. *Wjestnik. ophth.*, 1886, No. 3, p. 196.

Sections XII.–XXI. reviewed by DR. NIEDEN.

XII.—IRIS.

383. COUTURIER. De l'iritis dans les Vosges. *France méd.*, Aug., 1886.

384. CROSS. Cystic tumor of the iris. *Ophth. Soc. Great Brit.*, 1886, p. 67.

385. HIRSCHBERG, J. On serous cysts of the iris. *C. f. A.*, vol. x., p. 262.

386. JESSOP. Tubercle of the iris and choroid. *Ophth. Soc. Great Brit.*, 1886, p. 55.

387. KRÜCKOW, A. Primary melanosarcoma of the iris. *Wjestnik. ophth.*, May–June, 1886.

388. NETTLESHIP. Syphilitic iritis in an old glaucomatous eye. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 64.

389. NETTLESHIP. New formation of pigment on the front of the iris. *Ophth. Soc. Great Brit.*, 1886, p. 66.

COUTURIER (383) reports on 17 cases of serous iritis, and concludes from them that this affection is due not only to syphilis, but frequently also to scrofula. MARCKWORT.

CROSS (384) observed a cystic tumor of the iris, which was first noticed two years and nine months before he saw the patient. It enlarged for a year, and then subsided to the size of a pinhead. It again enlarged with redness and pain, and then became about the size of a pea. Subsequently the eye became perfectly quiet. FITZGERALD.

In an eye in which an iridectomy had been performed on account of glaucoma, and in which a large clear cyst of the iris had formed in the inner lower quadrant, filling the whole anterior chamber to the periphery, HIRSCHBERG (385) made a section with a Graefe knife at the corneal margin 7 *mm* long, perforating the wall of the cyst at the same time. Then he introduced a curved forceps, seized a piece as large as possible of the anterior wall of the cyst, with the iris tissue adhering to it, and abcised it. The result was good.

JESSOP (386) showed sections of the eye of a rabbit artificially inoculated with tubercle. The bacilli were cultivated on serum. In three weeks after injection into the anterior chamber there were well-marked tubercular deposits on the iris. The whole body showed signs of general tuberculosis. The animal lived 66 days.

FITZGERALD.

KRÜCKOW'S (387) case was that of a young woman aged twenty-eight. In the right eye there was $M = \frac{1}{36}$, $V = \frac{12}{30}$. Fundus normal. The upper outer quadrant of the iris had been converted into a dark-brown, slowly growing tumor, which filled one half of the pupil and was in contact with the posterior surface of the cornea. The patient says that she noticed a black spot ten years previously at the location now occupied by the tumor. Four months ago the author saw a severe hemorrhage into the anterior chamber. The tumor was successfuly removed and proved to be a melanosarcoma.

HIRSCHMANN.

NETTLESHIP'S (388) case was that of a man who had syphilitic iritis of both eyes. In the right an iridectomy had been performed five or six years before for glaucoma. The case is one of interest as showing that an acute inflammation from a constitutional cause may attack an iris which is probably somewhat atrophied.

FITZGERALD.

NETTLESHIP (389) saw the greater part of the front of the iris covered by a layer of dark reddish-brown pigment which entirely covered the inner circle of the iris, but even peripherically its outline was irregular. The patient was forty-three years old, and had had this eye operated on for cataract when twenty-one. It was very badly inflamed for two months afterwards.

FITZGERALD.

XIII.—CHOROID.

390. STEINHEIM, B. Anophthalmus dext. Coloboma iridis et chorioideæ sin. *C. f. A.*, 1886, p. 201.

STEINHEIM (390) observed in a girl nine months old anophthalmus dext., and in the left eye a coloboma of the iris lying in the horizontal meridian with the apex inwards, associated with a coloboma of the choroid including the whole papilla. There was no perception of light. There was no consanguinity of the parents. The three older children had normal eyes.

XIV.—GLAUCOMA.

391. Birnbacher, A., and Czermak, W. Contributions to the pathological anatomy and pathogeny of glaucoma. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 2, p. 1, and 3, p. 1 ff.

392. Javal. On glaucoma. Report of cases. *Sitzungsber. d. Heidelb. Ophth. Ges.*, 1886, vol. xxiii., p. 156 (*cf.* these Arch., vol. xvii., p. 212, Ger. Ed.).

393. Nettleship. Syphilitic iritis in an old glaucomatous eye. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 64.

Birnbacher and Czermak (391) present a detailed study of the pathological anatomy and pathogeny of glaucoma based on the anatomical examination of seven cases. They discuss the changes found, especially the ectasia of the sclera and the excavation of the optic disc. Then follows a description of the experiments on circulation and tension in the eye. For details see the original.

XV.—SYMPATHETIC OPHTHALMIA.

394. Brailey. Intraocular sarcoma exciting sympathetic disease. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 53.

395. Chevalier. De l'ophthalmie sympathique. *Thèse de Montpellier*, 1886. Recommends enucleation.

396. Hutchinson, J. On a blood theory in explanation of reflex ophthalmitis. *Ophth. Soc. Unit. Kingd.*, 1886, p. 71.

397. Milles. Sympathetic ophthalmitis. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 43.

Brailey (394) enucleated an eye afflicted with an intraocular sarcoma, as it was producing sympathetic trouble in the other; the latter subsequently recovered. Brailey considers that it is not the sarcoma itself directly, but the uveitis produced by it, which gives rise to the sympathetic inflammation, and that this case furnishes another example of the favorable influence of the removal of the exciting eye in sympathetic disease. Fitzgerald.

Milles (397) reports two cases of sympathetic ophthalmitis produced by intraocular sarcoma in the exciting eye. In one of the cases a perforation occurred and Milles suggested that possibly this was the exciting cause. In the other case there was no perforation. He also reports two other cases of sympathetic ophthalmitis, one due to traumatic keratitis in which both eyes had to be excised, the other case was due to extraction of cataract.

Fitzgerald.

XVI.—LENS.

398. Chibret. Les indications de l'iridectomie dans l'opération de la cataracte. *Arch. d'ophth.*, vol. vi., No. 4, July–Aug., 1886, p. 355.

399. Deutschmann, R. Pathologico-anatomical examination of a human zonular cataract. *v. Graefe's A. f. O.*, vol. xxxii., 2, p. 295.

400. Dujardin. Deux cataractes molles opérées par aspiration. *Journ. des sci. méd. de Lille*, Aug., 1886.

401. Kazaurow. The prevention of septic diseases of the eye after cataract-operations. *Wjestnik. ophth.*, July–Oct., 1886.

402. Landesberg, M. Rent in the anterior capsule of the lens produced by contusion. *Zeh. klin. Monatsbl.*, vol. xxiv., p. 320.

403. Landesberg, M. Clearing up of a traumatic cataract. *Zeh. klin. Monatsbl.*, vol. xxiv., p. 318.

404. Meyhöfer. Another case of cataract after a stroke of lightning. *Zeh. klin. Monatsbl.*, vol. xxiv., p. 375.

405. Meyhöfer. Remarks on cataract-operations. *Report of the Ophth. Clinic*, 1884–85, p. 22, 1886.

406. Motais. Observations des cataractes congénitales et traumatiques, traitées par l'aspiration du Dr. Redard. *Gaz. méd. de Paris*, Aug., 1886.

407. Rohmer. Maturation artificielle de la cataracte. *Union méd.*, 1886, p. 298.

408. Rothziegel (Vienna). The coincidence of cataract and nephritis. *Allg. Wiener med. Ztg.*, 1886, No. 30.

Chibret (398) generally makes a small iridectomy in extraction, to prevent incarceration of the iris, secondary cataract, and closure of the pupil. He omits it only in hard cataracts with little cortex and a certain tension of the iris. The coloboma has no optical disadvantages; on the contrary, Chibret found that people who had had an iridectomy performed in one eye and not in the other, saw better with the former eye.

v. Mittelstädt.

Deutschmann (399) gives us the first microscopical description of a case of incomplete double zonular cataract.

Kazaurow (401) observes the strictest antiseptic precautions in regard to instruments, field of operation, hands, etc. By strictly following these rules he has had no suppuration among the last 100 extractions. HIRSCHMANN.

LANDESBERG (402) observed after a perforating wound and a rent in the anterior capsule of the lens, absorption of the escaped masses of lens, closure of the opening in the capsule, and, within seven weeks, a clearing up of the opaque masses of cortex lying near the edge of the wound. With a weak convex cylindrical glass $V = \frac{15}{15}$.

After a severe blow upon the eye, LANDESBERG (403) saw a rent in the capsule of the lens 6 *mm* long, the cortex become opaque throughout the extent of the wound, and disappear by absorption after the rent in the capsule had closed spontaneously. $V = \frac{15}{15}$ E. The patient was under observation seven years, but no secondary symptoms developed.

MEYHÖFER (404) adds another to the eight cases thus far described of cataract after a stroke of lightning. It was confined to one side, on which the paresis of the limbs and tongue was most marked, and presented itself principally in form of opacities in the anterior and posterior capsule, and very minute dots in the cortex. The fundus was normal.

After describing his method of operating for cataract in detail, MEYHÖFER (405) recommends simple puncture of the anterior chamber followed by energetic massage of the lens, to ripen the cataract.

MOTAIS (406) recommends suction in congenital and traumatic cataract with Redard's apparatus. Three cases.

MARCKWORT.

ROHMER (407) recommends artificial ripening of cataract by division, escape of the aqueous, and massage, and bases his advice on a report of ten cases.

ROTHZIEGEL (408) examined the urine in 102 cases of uncomplicated cataract for albumen, and found traces in 27 cases, small quantities in 27, and large quantities in 2. In 15 the diagnosis of Bright's disease was made ; they had all passed their fiftieth year.

XVII.—RETINA AND FUNCTIONAL DISTURBANCES.

409. BETTREMIEUX, P. Décollement de la rétine et iridectomie. *Arch. d'ophth.*, vol. vi., 5, Sept.–Oct., 1886, p. 459.

410. NETTLESHIP. Central chorio-retinitis in one eye. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 76.

411. NETTLESHIP. Albuminuric retinitis coming on during pregnancy. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 67.

412. NETTLESHIP. On the pathological changes in syphilitic choroiditis and retinitis. *Ophth. Hosp. Rep.*, vol. xi., 1, 1886.

413. NETTLESHIP. Commotio retinæ. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 59.

414. V. REUSS. Congenital anomalies of the retina and optic nerve. *Wiener med. Presse*, No. 9; *C. f. A.*, vol. x., p. 287.

415. UHLE. Amblyopia after a stroke of lightning. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 379.

BETTREMIEUX (409) recommends iridectomy in recent cases of detachment of the retina, basing his views upon recent statistics of Dransart, who in sixteen cases had 68 % of cure, and has had some patients six years under observation without a relapse. The author himself operated four cases, and succeeded in two. How the iridectomy acts can only be surmised. V. MITTELSTÄDT.

NETTLESHIP'S (410) patient while shooting at Wimbledon in a hot sun noticed in the evening that every thing looked reddish with the left eye. The day after his return home a black spot came before the eye. V about the same in both, the region of the macula darker in the left than in the right. Several small pigment collections lying upon palish spots about circumference of macula with fine whitish stippling about the fovea centralis. Nettleship thinks, notwithstanding the asymmetry of the disease, that it was caused by the exposure to the strong sunlight.

FITZGERALD.

In NETTLESHIP'S (411) second case the retinitis occurred in a woman in an advanced stage of pregnancy. Premature labor was induced, and in a few weeks the patient had regained her health and the eyes had greatly improved. FITZGERALD.

NETTLESHIP (412) gives a minute account of the pathological changes he has found in choroid and retina, with drawings of the microscopic preparations, together with the clinical history of the cases from which they are taken. He considers that the opinion held by Prof. Förster, viz., that the retinitis in syphilis is for the most part a consequence of the choroiditis, and the rival opinion of Dr. Ole Bull, viz., that the choroiditis is, as a rule, secondary to the retinitis, are both too absolute, and that there are cases to prove that neither is universally true. FITZGERALD.

NETTLESHIP'S (413) patient was struck on the eye with a cricket ball. Round the macula there was a well-marked, radiating, watered-silk appearance. This Nettleship states is by no means uncommon in children after blows upon the eye. In another case he reports it remained permanently. FITZGERALD.

v. REUSS (414) reports a peculiar ophthalmoscopic appearance of the fundus in a girl suffering with progressive atrophy of one side of the face. It was covered with numerous bright, round dots, which by their confluence formed the most peculiar figures. Only a narrow zone around the optic nerve was free from the dots, while in the periphery they were less developed. The dots were of a reddish-yellow color, and the retinal blood-vessels passed over them. There were no disturbances of vision; the dots were probably the result of fine congenital changes in the pigment epithelium.

UHLE (415) describes a case of anæmia of the optic nerve and retina due to a stroke of lightning. It was observed in the right eye of a young girl, and for three weeks afterwards the papilla appeared perfectly white, while the central blood-vessels were very much contracted. From the fact that after the inhalation of nitrite of amyl and the use of eserine, on account of the widely dilated pupil, V rose to $\frac{20}{20}$ and the ophthalmoscopic appearance became normal, Uhle concludes that the anæmia was due to the continued irritation of the sympathetic nerve.

XVIII.—OPTIC NERVE.

416. DESPAGNET. Les injections hypodermiques de cyanure d'or et de potassium. *Rec. d'ophth.*, 1886, p. 548.

417. DUMONT. Atrophie papillaire, suite de névro-rétinite albuminurique. *Bull. de la clin. nat. ophth.*, vol. iv., No. 4, p. 142.

418. LANDESBERG, M. Neuritis retrobulbaris periph. acuta oc. dext. *Zeh. klin. Monatsbl.*, vol. xxiv., p. 316.

419. NETTLESHIP. Atrophy of one optic nerve after papillitis from erysipelas affecting orbit during convalescence from scarlet-fever. Cellulitis had probably extended from erysipelas of the face. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 65.

420. v. REUSS. Congenital anomalies of the optic nerve. *Wiener med. Presse*, No. 9, ff.

421. WEILAND, A. Retrobulbar neuritis after erysipelas of the face. Recovery. *Deutsche med. Wochenschr.*, No. 39, 1886.

422. ULRICH. On choked disc. *Sitzungsber. d. Heidelb. ophth. Ges.*, 1886, vol. xvii., p. 93.

Despagnet (416) again recommends subcutaneous injections of cyanide of gold and potassium, but is strenuously opposed to injections of strychnine. **Marckwort.**

Landesberg (418) reports a case of acute retrobulbar neuritis of rheumatic origin, which he observed in a girl aged seventeen. The acute pain on movements of the globe, the normal appearance of the fundus, and the rapid recovery, in nine days, by the use of iodide of potassium, were characteristic of the affection.

v. **Reuss** (420) describes a congenital peculiarity of color of the optic nerve, the latter being of a dark grayish red, but the nerve fibres transparent ; the blood-vessels were edged with white shining tissue, which formed a stellate plate at the centre of the papilla.

Weiland (421) describes a case of total amaurosis of the right eye after erysipelas of the same side of the face, accompanied with indistinctness of the papilla and contraction of the blood-vessels. Sight was perfectly restored in two weeks after diaphoretic treatment. The case was probably one of neuritis retrobulbaris, though the eyeball was not sensitive to pressure and movements caused no pain.

Ulrich (422) reports on three cases of tumor of the brain in which he could observe the beginning and development of choked disc. The autopsy showed œdema of the optic nerve and compression of the central blood-vessels. It was probably only a secondary œdema in direct connection with the œdema of the brain.

XIX.—INJURIES (FOREIGN BODIES) AND PARASITES.

423. **Dumont.** Rupture de la sclérotique, enclavement de l'iris dans la plaie. Guérison. *Bull. de la clin. nat. ophth.*, vol. iv., 3, p. 143.

424. **Franke, E.** On rents in the sphincter of the iris, with remarks on the mechanics of rupture of the choroid. *v. Graefe's Arch. f. Ophth.*, vol. xxii., p. 261.

425. v. **Moll.** On wounds in the ciliary region. *Zeh. klin. Monatsbl.*, vol. xxiv., p. 299.

Franke (424), before describing his case of rents in the sphincter of the iris combined with double rupture of the choroid, briefly relates the twelve cases thus far reported, and adds the views of the different authors in regard to the pathogeny of this injury. In Franke's case there were eight rents 1 *mm* long at the pupillary margin ; one went through the macula, and another parallel one was situated between the macula and papilla. Franke attributes the rupture to the stretching of the choroid, which ends at the papilla, and in consequence of its increased strength at that point can only tear at some distance from the papilla. The stretching of the choroid is due to a change in the shape of the globe produced by the blow, and to the pressure of the vitreous acting from within outward.

In accordance with the latest views on sympathetic ophthalmia, v. MOLL (425) favors conservative measures even in extensive injuries in the ciliary region. He quotes four cases which formerly would have been enucleated on account of the extent of the injury and the fear of sympathetic ophthalmia. In three a good result was obtained ; one eye had to be enucleated on account of subsequent cyclitis. No sutures were inserted.

XX.—OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

426. BAAS. A rare sequence to epidemic parotitis. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 273.

427. BADAL. Recherches statistiques sur les manifestations oculaires de la syphilis (suite). *Arch. d'ophth.*, vol. vi., 4, July–Aug., 1886, p. 301.

428. BORTHEN LIJDER. Oftalmomalacie. *Med. Revüe*, Bergen, May, 1886.

429. DUMONT. Rétinite albuminurique chez un diabétique. *Bull. de la clin. nat. ophth.*, vol. iv., No. 3, p. 141.

430. HIRSCHBERG, J. Case of cerebral tumor. *C. f. A.*, vol. x., p. 228.

431. HIRSCHBERG, J. Diabetes in private practice. *C. f. A.*, vol. x., p. 193.

432. KAMOCKI. Pathologico-anatomical investigations of diabetic eyes. *Sitzungsber. d. ophth. Ges. zu Heidelberg*, vol. xviii., p. 102 (*v.* these ARCH., vol. xvii., p. 65, Ger. Ed.).

433. MANDET. Ophthalmie varolique chez un enfant de 15 jours. Cécité consécutive par iridochorioidite ; enucléation de l'œil droit. *Jour. des sci. méd. de Lille*, Sept. 18, 1886.

434. NIEDEN, A. Case of dyslexia, with report of autopsy.

Tagebl. d. Naturforscher-Versamml. zu Berlin, 1886, p. 156 (*cf.* these ARCH., vol. xvii., p. 211, Ger. Ed.).

435. OPPENHEIM, H. Case of gummous affection of the chiasma. *Virchow's Arch. f. path. Anat.*, vol. civ., 1886.

436. PRÖLSS, E. An affection of the cervical sympathetic nerve. *Inaug. Diss.*, Berlin, *C. f. A.*, vol. x., p. 320.

437. RADZISZEWSKY. Observation d'anophthalmie avec hernies bilatérales congénitales du cerveau. *Rec. d'ophth.*, 1886, p. 481, and *Progr. méd.*, Aug., 1886. Clinical diagnosis only.

438. WATSON. An intraocular gumma in a child, the subject of inherited syphilis. *Ophth. Soc. Great Brit.*, 1886, p. 56.

439. ZIEM. The dependence of some ocular diseases on affections of the pharynx. *Allg. med. Central-Ztg.*, 1886, No. 20.

BAAS (426) observed paresis of accommodation in a child aged seven after epidemic parotitis, without preceding diphtheria of the mouth or throat respectively.

BADAL (427) found 144 cases of paralysis of the muscles among his 631 observations of syphilis of the eye (*cf. Arch. d'ophth.*, vol. vi., No. 2, March–April, 1886, p. 103). The oculomotor nerve is most frequently affected, then the abducens; paresis of the oblique and facial nerves is very rare. He adds a review of those cases of paresis complicated with affections of the eye and central organs. Affections of the optic nerve are next in point of frequency; these were observed in 139 cases, or twenty-two per cent. The complications are also mentioned. Three cures illustrate the frequency of the affections of the muscles, of neuritis, and of atrophy of the optic nerve, and the time of life of their occurrence. v. MITTELSTÄDT.

HIRSCHBERG (430) diagnosticated a tumor of the right frontal lobe in a man aged twenty-one, who since birth had had numerous brown, hairy moles in the face, on the body and limbs, basing the diagnosis on binocular neuritis, left-sided hemiparesis, right-sided paralysis of the abducens, and other cerebral symptoms. The autopsy revealed a melanosarcoma the size of a hen's egg, accompanied with diffuse, blackish-brown pigmentation of the frontal side of the cerebrum and similar coloration of the inner sheath at the optic nerve. The sheaths behind the globe were dilated like ampullæ.

HIRSCHBERG (431) found that diabetes is much more frequent in the wealthier classes, as he found sugar in seventeen cases among 1,638 examined. The most frequent disturbance is due to limitation of the power of accommodation. Brief clinical histories illustrate the complications, such as iritis, cataract, retinitis, amblyopia, atrophy of the optic nerve, and diplopia.

OPPENHEIM (435) observed in a woman aged thirty-one, who had become syphilitic through her husband, hemianopsia, with slight contraction of the nasal side of the visual field, and cerebral symptoms, vomiting, polydipsia, and polyuria. The hemianopsia disappeared temporarily, vision gradually diminished. The appearance of the fundus differed only slightly from the normal. The autopsy revealed a gumma in the central portion of the chiasma which had extended to the right side. The temporary disappearance of the hemianopsia may be explained by the great vascularity and consequent power of dilatation and contraction of the tumor.

PRÖLSS (436) describes a case of affection of the cervical sympathetic nerve which was accidentally found at Hirschberg's clinic. It affected the left side, was probably a sequence of typhoid fever, and showed the characteristic symptoms : enophthalmus, contraction of the palpebral fissure and the pupil, slight ptosis and anhydrosis, and imperfect growth of the hair on the left side of the head. Sensibility of both sides of the face normal.

WATSON (438) describes a case of intraocular gumma in a child aged six, the subject of inherited syphilis, whose right eye first presented the appearance of scrofulous keratitis. Subsequently a small hypopyon formed, then when the aqueous and cornea became clearer, a yellowish deposit was seen to occupy the pupil, and a prominence the size of a small split pea had formed on the upper and outer ciliary region of the sclerotic. This was twice punctured, and a yellow, cheesy, semi-solid substance presented in the wound. The child had a serpiginous ulcer on the thigh and chronic laryngitis, and the mother gave a history of having suffered from secondary symptoms after the birth of the child. The child was put on mercurial treatment, which was followed by marked improvement, but the eye was evidently shrinking. Watson emphasizes the following points in the case : (1) The difficulty of diagnosis in the early stage ; (2) the rarity of the lesion in connection with inherited syphilis. FITZGERALD.

ZIEM (439) has often permanently cured cases of epiphora, blepharospasm, and recurrent affections of the conjunctiva and cornea, which had resisted local treatment, by the operative removal of adenoid vegetations from the naso-pharynx, of hypertrophied tonsils, etc. Disturbances of circulation had probably developed in the cavernous parts of the nasal mucous membrane, and had produced a similar condition in the eye. Thus the asthenopia in chronic swelling of the tonsils may be explained by swelling in the eye, in the ciliary body. In all ocular diseases associated with affections of the naso-pharynx the whole territory of the nasal mucous membrane must be examined and treated if necessary.

REVIEWS.

A Practical Treatise on Diseases of the Eye. By Dr. ÉDUARD MEYER. Translated from the third French edition, with the assistance of the author, by FREELAND FERGUS, M.B. Philadelphia: P. Blakiston, Son, & Co., 1887. Pp. 647. Price, cloth, $4.50.

A work that has gone through three French and four German editions, has been translated into Italian, Spanish, Polish, Russian, and Japanese, may well bid defiance to the critic, should any one be so bold as to assume that rôle. This is the fortunate condition of Dr. Meyer's treatise, the English translation of which is before us. The cause of its popularity is not far to seek. It is clear, concise, conservative, and eminently — as its title indicates — "practical." If we have any fault to find with the work it is that it has not enough of theory; that fundamental principles are not set forth with sufficient fulness in some instances for a satisfactory appreciation of the practical aphorisms, and that its conservatism is carried to such a degree as to fall, in some instances, behind the spirit of the times. In speaking of the operation of cataract-extraction, for instance, a full and quite detailed account is given of the old flap method, which is practised by few, if any, prominent operators, while the operation without an iridectomy, as practised by nearly all the French surgeons and rapidly coming to the fore in this country, is dismissed with a single short paragraph. In mentioning the method he says: "Doubtless our progress in the knowledge of antiseptics, local anæsthesia, and myotics warrants and explains these attempts; and the general adoption will depend upon the benefits arising from them rather than upon the attacks now directed against extraction with iridectomy, which has been advocated for the last twenty years and supported by numerous favorable statistics" (p.

383). Antisepsis is not considered with the fulness the present interest in the subject demands.

The specialist will note, among other points of interest, that the author recognizes the existence of "amblyopia exanopsia"; that jequirity is not more than mentioned, and sclerotomy is treated coldly; that, though "skiascopy" is spoken of, the name of Cuignet, its discoverer, is nowhere to be found, but in its stead those of Parent and Chibret.

The chapter on the muscles of the eye, with the physiology and pathology of its movements, is of exceeding excellence, and for the student is the best we know of anywhere.

We have not the least doubt that, in spite of the few shortcomings (as they appear to us) above noted, the work will find, in its English dress, the same popularity, as a text-book, which has been accorded to it in other countries and other tongues.

S. M. B.

SWAN M. BURNETT: **A Theoretical and Practical Treatise on Astigmatism.** With fifty-nine diagrams and illustrations. J. H. Chambers & Co., St. Louis, Mo. Price $3.50. Reviewed by H. Knapp.

Dr. Burnett has united in a monograph of 245 pages all that is essential to a thorough understanding of the principles of astigmatism and the successful management of patients suffering from this most important anomaly of refraction. Presupposing no special knowledge on the part of his readers, he describes in the first chapter the elementary phenomena of refraction. The second chapter enters into the dioptrics of asymmetrical bodies, in which the author, in conjunction with Prof. Harkness, has made original investigations, chiefly on the refraction of rays impinging at some distance from the axis of the system. The refraction at the sharper and blunter ends of an ellipse, of bi-axial and tri-axial ellipsoids, the focal lines and planes, etc., are critically reviewed, in an elementary way.

If the author says, page 29: "The circular section of the focal interval will not be found in the [his] figure as is represented in all the figures that I have seen, except those given by Mauthner, and as it is actually described as being by several [for instance, by Donders] in the middle of the focal interval, but always nearer to the anterior focal plane," the reviewer begs leave to remark that he, in a paper in vol. viii., part 2, of *Graefe's Archives*, p. 205, etc., 1862, determined the length of the focal interval, the length of the focal lines, the position and the radius of the circular section of the focal interval both mathematically and experimentally. The demonstrations of Mauthner,[1] 1876, and Burnett, as far as they go, are the same as those of the reviewer.

The third chapter treats of the astigmatism of the human eye, the history of the astigmatism of the cornea, the different forms of ametropia, and the varieties of astigmatism. The fourth, fifth, and sixth chapters are on the subjective diagnosis of astigmatism, describing the different methods and tests in a clear and practical way, pointing out their advantages, as well as their inconveniences and fallacies.

The seventh chapter gives an excellent exposition of the ophthalmoscopic diagnosis of astigmatism, by the direct and indirect methods, with diagrams and wood-engravings illustrating the instruments, their use, and the appearances of the fundus of astigmatic eyes.

The eighth chapter very clearly describes the shadow-test (skiascopy, pupilloscopy, etc.). The author expresses his standpoint on this question as follows, p. 120: "When one becomes skilful in the use of this method, an approximation to within 1 D of the optical state of the eye can be made in the majority of cases. For its most satisfactory employment a wide pupil is essential, and it is necessary that the eye examined shall be protected thoroughly from all light except that which comes from the mirror.

"Like most of the other methods of objective examination, it requires much practice to become expert in its use, and is, according to my experience, more consumptive of time than the ordinary ophthalmoscopic methods."

The ninth chapter, keratometry and keratoscopy, does justice to the ophthalmometer of Javal and Schiötz, "which, in my estimation, must be regarded as the most important, practical, and exact means of diagnosis given to our science since the invention of the ophthalmoscope." The instrument and its use, with a table showing results of the author's own measurements, are described [more fully in his paper, in vol. xiv., p. 169 of these ARCHIVES], as well as the keratoscopes of Pacido and De Wecker.

The symptoms and causes of astigmatism are the subjects of chapters ten and eleven. Asthenopia and the nervous symptoms due to eye-strain are briefly but forcibly stated. The correction of astigmatism (chap. twelve), a goodly part of the daily work of the ophthalmic practitioner, contains excellent hints, but might, we think, have been more elaborately treated, giving, in systematic order, the management of the numerous varieties of simple and compound astigmatism, in young and old people, and for different occupations. If, however, the reader supplements this chapter by the expositions contained in previous parts, more especially in chapter four, he will find all he needs.

---

[1] "Opt. Fehler der Auges," p. 711.

The work concludes with a chapter on irregular astigmatism and conical cornea, and an appendix, a statistical record of 806 astigmatic eyes, examined by the author, in 36 % of which V was raised to $\frac{20}{20}$.

The book is well written, handsomely printed, largely illustrated by almost exclusively original drawings, and, in our opinion, fully equal to its purpose to furnish the student and practitioner a sure and complete guide in his study of theoretical and practical astigmatism. To the expert, the collection of the material and the extensive bibliography will be of great interest and profit.

MISCELLANEOUS.

The oculist, Dr. Louis Jany, died Dec. 9, 1886, at Breslau, in his fifty-fourth year. He was the author of numerous papers, some of which were published in these Archives.

Privat-Docent Dr. Helfreich, of Würzburg, has been appointed honorary Professor of that University.

Prof. Schnabel, of Innsbruck, has been appointed to the Professorship of Ophthalmology at Graz vacated by Prof. Dr. Blodig.

Dr. Borysiekiewicz, Privat-Docent, has been appointed Professor of Ophthalmology at the University of Innsbruck, Tyrol, to succeed Professor Schnabel.

Dr. Geo. S. Norton has been appointed to succeed the late Prof. Liebold in the Chair of Ophthalmology at the N. Y. Homœopathic Medical College.

Prof. B. F. Fryer has resigned the Chair of Ophthalmology and Otology in the Kansas City Med. College.

Prof. Dr. Johann Friedrich Horner, one of the most eminent scientists and teachers of ophthalmology, died Dec. 21, 1886, at Zurich, his native city. He was born March 21, 1831, and received his early education at the Zurich "Gymnasium," which he left in 1849, and then began to study medicine at the University. He was especially attracted by the lectures of the physiologist, Ludwig, and the clinicist, Hasse. After passing his examination he went to Berlin, where he became acquainted with Albrecht v. Graefe, through whose influence he was induced to devote himself exclusively to the study of ophthalmology. For two years, 1854 and 1855, he was his assistant, and ever afterwards remained a close friend of his teacher. After devoting some time to study at Paris and London he established himself in 1856 at the University of Zurich as "Docent" of ophthalmology and began to practice as an oculist. He rapidly obtained a large practice and his fame soon spread beyond the narrow confines of his native country. In 1862 Horner was made Professor Ordinarius and was placed in charge of a ward for eye-patients in the hospital of the canton. In 1884 the first symptoms of heart and kidney-disease manifested themselves, and in the fall of 1885 forced him to retire from his professorship. In the spring of 1886 his condition improved, so that he could again attend to a part of his practice. On Dec. 17th he had a stroke of apoplexy, and died on the 21st.

Horner did not do as much literary work as might be supposed. His most important publications appeared in dissertations of his scholars ; others can be found in *Zehender's klin. Monatsblätter für Augenheilkunde*, and in the *Correspondenzblatt für Schweizer Aerzte.* His most important publication was "The Diseases of the Eye in Childhood" ("Handbuch der Kinderheilkunde," Gerhardt, Tübingen, 1879). His great skill as a successful operator of cataract and his researches on the antiseptic treatment of wounds were well known ; he discovered the rhachitic form of the teeth in zonular cataract, and the mycotic origin of corneal ulcers. Many prominent oculists have been his assistants, among others MICHEL (Würzburg), LANDOLT (Paris), HAAB (Zurich), KNIES (Freiburg), SCHÖN (Leipzig).

UNITED STATES ARMY MEDICAL DEPARTMENT.

VOL. XVI. No. 3.

ARCHIVES OF OPHTHALMOLOGY.

THE OPERATIONS FOR PRIMARY AND SECONDARY CATARACTS.

By Dr. C. SCHWEIGGER,

GEH. MEDICINAL-RATH AND PROFESSOR IN THE UNIVERSITY OF BERLIN.

Translated by Dr. Cornelius Williams, Saint Paul, Minnesota.

THERE is to-day a peculiar indescribable pleasure in reading the remarks with which v. Gräfe introduced his method of cataract extraction. How quickly every thing has changed! Gräfe very soon overcame the earlier difficulties in his way. The traction instrument, together with the slide-manœuvre, was soon abandoned. Even the very peculiarities upon which v. Gräfe laid so much stress have become of doubtful utility.

The simple flap section, defended by Steffan,[1] as early as 1867, had prevailed; and our present method of operation is neither peripheric nor linear, and even the careful cutting away of bits of iris in the angles of the wound, is no longer observed. A large corneal section and a small iridectomy are now generally preferred.

The linear section, because of its mathematical origin, came with a certain claim of distinction about it which had its influence so long as that prejudice remained in its favor, and the greater facility with which wounds of the sclera healed as compared with those of the transparent cornea, was once an established fact which had reached about the average age of a pathological truth.

Wound suppuration after cataract extraction is, however, induced by the entrance of the cocci of suppuration, and the proposition that the limbus conjunctivæ should behave differently, as to the staphycocci, than the transparent cornea, is so improbable that it must first be experimentally proven.

---

[1] Erfahrungen und Studien.

There is one characteristic of scleral sections, however, which does not, as such, belong to corneal sections, namely, the tendency to the formation of cystoid scars.

This von Gräfe regarded as peculiar to glaucoma, but it is also observed in scleral sections for cataract, and is not apt to occur in glaucoma operations if the section be laid in the cornea.

All this, however, shall not weigh as against v. Gräfe, but only as the development of the work begun by him. While Gräfe sought in vain for a name for his method which should be sufficiently descriptive, we cannot do better than call it after his name. Even though we have deviated in some respect from the views originally conceived by him, the essence remains the same, and the v. Gräfe method of cataract extraction will always hold its place in ophthalmology. V. Gräfe himself maintained this claim. The most prominent feature of his operation consists in this: that the delivery of the lens is in every respect different from that in which a large flap is made. In the latter method, tilting of the lens demands a considerable portion of the available space in order that the lens may clear the pupillary border, while it further demands a very large gaping of the wound. In von Gräfe's method the edge of the lens is applied to the corneal wound, and, in consequence, its exit is in a straight line. The sections need be, therefore, only large enough to permit the lens to pass out without great force; but for the very reason that we wish to avoid this waste of space necessitated by the tilting of the lens, an iridectomy is necessary. Since the material difference in the two methods consists in the manner of delivery of the lens, it will be worth while to introduce some comparisons as to the operative procedures which are immediately connected therewith. In this relation comes: 1st. The opening of the capsule with the cystotome as practised by v. Gräfe. 2d. Opening of the posterior capsule in the hyaloid fossa. 3d. Opening of the capsule with the forceps. 4th. Peripheral capsulotomy.

Under all circumstances, the section was made upwards. Its chord lay from 3 to 4 millimetres below the apex of the cornea. Puncture and counter-puncture close to the outer border of the limbus, the section itself lying along the inner border of the same. It is well to examine the cornea carefully, however, before operating, since the line of demarcation between opaque and transparent tissue is not always an ellipse with its longer axis horizontal ; the latter may be vertical, and a section made in the usual way will be too small, which is the worst thing that can happen in extraction. The section is made with the narrow knife, the iridectomy is confined to the central portion of the wound, and after incision of the capsule the lens is pushed out by means of a spatula applied close to the lower border of the cornea. In cases of difficult delivery of the lens, gentle counter-pressure should be made by means of a spatula applied to the upper lip of the wound. The removal of cortical remnants is accomplished in like manner. The bandage should be changed several times daily, especially if there be pain, which is often due simply to collection of tears in the conjunctival sac. The only applications made to the eye itself are atropine, and, in case of considerable iritis, moist warmth. The eye should be examined as little as possible during the process of healing.

In the following considerations, I have only included those cases operated upon by me in my private hospital, where the after-treatment was concluded by myself alone. The clinical notes are also my own. If I had wished to include the cases operated upon in the university clinic, the total would have been at least three times as large, but the statistics would have gained nothing in exactness.

The statistics as to cataract operations in a large clinic, year in and year out, are quite untrustworthy. Who will answer for it that particulars of each operation are carefully kept ? How easy it is, in the course of a year, for the history of one or more cases to be lost, there being no registrar for the safe-keeping of these documents. Furthermore, the histories are kept generally by the assistants, who frequently change in the course of years. Is it to be supposed that they all work with the same exactitude and conscientiousness? Finally, however, the clinical history ends when the patient leaves the hospital. Upon his return he belongs to the policlinic, and it is very difficult, indeed impracticable, to follow clinical histories in the policlinic. It will thus appear that the condition noted at the time of the patient's discharge remains unchanged, as far as shown by the history, even though the eye be subsequently lost as the result of the operation; this has a very marked influence upon the percentage of loss, which only records those cases in which the eye was completely lost immediately after the operation. Immediate loss of the eye is less frequent than subsequent loss, the patient having been discharged with $V = \frac{1}{10}$, but becomes blind as the result of chronic choroiditis produced by the operation.

Starting out with the proposition to report upon those cases only which had been operated upon in my private hospital, I find it necessary to make an exception as to those in which peripheral capsulotomy was done. This proceeding is of more recent origin, and I have included in this review those cases so operated upon in the university clinic during the first six months of 1886. I am justified in so including these cases, since I can fully rely upon the completeness and exactness of the clinical histories kept by Dr. Silex and Dr. Beselin.

All cases in which the visual acuteness attained has equalled at least $\frac{1}{6}$, have been classified together as perfect results,—this, with the necessary correcting glasses, but without stenopaic apparatus. V. Gräfe was accustomed to reckon as a perfect result a case in which $V = \frac{1}{10}$. This I do not think quite justifiable, since $V = \frac{1}{10}$ is not sufficient for reading and writing. In some cases vision did not quite equal $\frac{1}{6}$ at the time of discharge of the patient. On the average, three weeks from the time of operation, but in the course of a few weeks or months without any operative interference, vision had so improved that a perfect result had been attained. These cases, as a matter of course, should not be classed with the secondary cataracts.

The second group is made up of the secondary cataract, *i. e.*, those cases in which the pupillary region is occupied by opacities. In this group are included those cases in which the prognosis of an operation is favorable. Those cases in which perception of light was still good, with field complete, perceiving the motion of the hand, etc., but which, from the circumstances of the case, offered no probability of improvement, are classified with the losses. Those cases have also been reckoned as losses in which, even though they possessed a visual acuteness of greater than $\frac{1}{8}$ at the time of their discharge, yet carried with them the germ of their destruction. He who wishes to shine with brilliant statistics might of course act differently.

(1) The method first recommended by Adam Schmidt, then by Rivaud-Landrau and Hasner, latterly again by Rheindorf,[1] the so-called "Glaskörperstich" (immediate division of the posterior capsule), played a most important rôle in the heated campaign which Hasner had undertaken in favor of the old flap operation. Hasner is not wholly wrong in this; indeed, the old flap extraction has its indications, and I confess that I am beginning again to regard it favorably, with the posterior capsulotomy omitted.

The immediate result of posterior capsulotomy directly after extraction is the gushing forward of vitreous, most frequently with decided dilatation of the pupil, and also in about one third of the cases artificial prolapse of vitreous. This procedure is adopted in the hope that the lips of the incision, not only in the posterior capsule, but in the anterior as well, will be held asunder by the vitreous, and that thereby secondary cataract would be prevented; yet, in many cases after the healing process has been completed, no trace of this incision can be found.

Of course only those cases can be placed in this class in which nothing abnormal has occurred. When, either during or after extraction of the lens, loss of vitreous takes place, then opening of the posterior capsule in the hyaloid fossa was omitted, and the cases were counted among those in which the capsule is opened in the usual way.

---

[1] "Beobachtunge nüber den Glaskörperstich," Leipzig und Heidelberg, 1881. *Vid.* also Arlt, Operationslehre, "Graefe-Saemisch's Handbuch," p. 272.

Immediate posterior capsulotomy was done in my private practice in 68 cases, in which

(1) V = $\frac{1}{6}$ or more was obtained in . . 40 = 58.8 %.

(2) Secondary cataract in . . . . . 22 = 32.4 %.

Of these a second operation was done in ten cases with result of V = $\frac{1}{6}$ or more; the others never came for further treatment.

(3) Loss . . . . 6 = 8.8 %.

If we count in those cases in which an after-operation brought the vision up to a perfect result, the percentage is increased to 73.5. On the other hand it is not fair to charge the posterior capsulotomy with all the losses, because the element of chance plays a prominent part, as an analysis in detail of the losses would show. Nevertheless it is shown that the expectation, that the necessity for a second operation would be done away with, has not been justified.

(2) Colsmann[1] and Förster[2] proposed to open the capsule by means of a forceps. Their proposition was based upon the evident fact that a piece of capsule removed from the eye could not participate in the formation of secondary cataract. To accomplish this end the capsule forceps is certainly the instrument for the purpose. The attempt to circumcise and then extract a piece of the lens capsule, as described by Couradi[3] as early as 1791, is often little more than pantomime—the capsule is invisible, and once incised the edges gape so that at the second cut it is impossible to tell whether the capsule or simply the exposed lens mass is cut.

At first I used, as Colsmann and Förster had done, a forceps the teeth of which were set on the under surface horizontally without any downward prolongation, and so arranged as to interlock. These forceps, however, did not always seize the capsule, and as I at that time always operated with the patient anæsthetized, I soon became convinced that on account of the complete relaxation of all the ocular muscles under chloroform narcosis, forceps with teeth projecting downwards would be perfectly practicable. With the upper surface of the forceps-blades the cornea was slightly raised until the forceps were over the anterior pole of the lens; the teeth of the open instrument were then allowed to sink into the capsule, when very often a piece of the capsule of tolerable size was withdrawn. As many as possible of these pieces were collected and sent to Heidelberg for examination. Prof. Becker was kind enough to inform me that frequently pieces of the posterior capsule were also torn away, and the question naturally arose, if prolapse of vitreous did not necessarily occur in these cases. A review of my clinical histories reveals that among twenty cases in which a large piece of the capsule was torn away, there was slight prolapse of vitreous in only four. In those cases in which it was not noted that a large piece of capsule had been withdrawn, prolapse of vitreous occurred three times at the finish of the operation, in attempts to remove lens remnants, or to free a piece of iris wedged in the angle of the wound, an accident such as might occur in the employment of any method. I with Förster am unable to find that prolapse of vitreous is favored by the use of the capsule forceps.

---

[1] The Removal of a Large Piece of the Anterior Capsule Entire. Wiesbaden, 1879.

[2] These ARCHIVES, 1882, vol. xi., p. 344.

[3] Arlt, Operationslehre, p. 272.

The operation was done in my private practice seventy-eight times; one case must, for the present, be excluded, because extensive detachment of the retina, which existed before the operation, rendered a good result impossible. The healing process was entirely normal, and had it not been for the intraocular complication a good result would have been attained. A computation based on seventy-seven cases gives the following result:

(1) Immediate result, $V = \frac{1}{6}$ or more, . 60 = 78.1 %.
(2) Secondary cataract, ... 10 = 12.9 %.
Of these latter six cases, as the result of a second operation, obtained $V = \frac{1}{6}$ or more. In one case the result was nullified by iritis; the others never presented themselves for operation.
(3) Losses, ... 7 = 9.0 %.

If we count those cases in which, as the result of an after-operation, a perfect result was obtained, and the case in which there was detachment of the retina, which had otherwise been a success, we have a percentage of success equal to 88.

Among the losses one case was counted with $V = \frac{1}{4}$, but which had choroiditis. Two were doomed through wound-infection, in spite of the most careful disinfection of the instruments and washing of the conjunctival sac, once with carbolic acid and once with salicylic acid. In four cases irido-choroiditis was the cause of the blindness.

In the two series just described the losses from irido-choroiditis are materially greater than in the two which follow. This may, however, very well be not in any measure dependent upon the manner of opening the capsule, for in by far the greater number of cases in the two following series corrosive sublimate (1 to 5,000) was used as a disinfectant.

(3) After the discovery of cocaine I again laid aside the capsule-forceps and returned to division of the capsule by means of the cystotome. The division of the capsule was effected as von Gräfe usually did it, by dividing it from below upward along its whole extent on the temporal and medial side of the pupil, and finally by joining the two incisions above by another parallel with the superior border of the lens. A number of cases appear in this series which were operated upon at the time when I was experimenting with posterior capsulotomy (Glaskörperstich), but which for some reason was not considered appropriate, or for the very reason that escape of vitreous had already supervened.

By this method sixty-three eyes were operated upon. Three cases must be left out of the count at present; two of them were complicated with atrophic degeneration of the nerve (not progressive atrophy), but in which vision was improved in so far as the condition would permit. Both cases healed kindly, and if it had not been for the atrophy would have been perfect results. The third case was that of a female patient who was seized with bilious colic at the end of the second week, and was therefore not in a condition to be examined at the time of her discharge. The course of healing was throughout favorable, and the glasses which were ordered probably gave good vision from data furnished later. Counting sixty cases, then, we have

(1) Immediate result, $V = \frac{1}{6}$, or better . 45 = 75.0 %
(2) Secondary cataract . . . . . 13 = 21.66 %
Of these four cases were converted by an after-operation into perfect results; the remainder did not present themselves for further treatment.
(3) Loss . . . . 2 = 3.33 %

If we count in the three cases with normal healing, and the four cases in which an after-operation gave a perfect result, then we have 76.2 % of perfect results. Of the two cases lost, one had $V = \frac{1}{6}$ at the time of his discharge, but became blind three months afterwards from irido-choroiditis. The second was a cataracta nigra, blind from iridochoroiditis.

(4) Peripheral capsulotomy, first described and done by Gayet,[1] of Lyons, in 1873, and practised chiefly by Knapp since 1878, has found few advocates, because the impression prevailed that a second operation was always necessary to prevent subsequent opacification of the capsule. I postponed my desire to give this method a trial until after I had an opportunity to witness the operation in detail as done by Knapp himself towards the end of the year 1885.

Hence my observations extend over a relatively short period, and therefore the cases operated upon in my private hospital are too few in number to justify a conclusion. I have, as in a former case, included those cases so operated upon by me in the university clinic for the first six months of 1886. As a matter of course only those cases appear in which peripheral capsulotomy was done, and not those, for example, in which the flap extraction was performed, or in which, on account of dislocation of the lens occurring either during the operation or having existed before, the lens was removed in its capsule.

---

[1] *Arch. f. Augenheilk.*, Bd. vii., S. 203, and Bd. xi., 549.

The operation is very simple. After the section of the cornea has been made and the iridectomy has been done, a sharp cystotome is introduced under the medial border of the iris coloboma, and the capsule is divided parallel to the æquator, to a point under the temporal border. The better result is obtained if the capsule is divided close to the periphery, but on the anterior surface of the lens. In the case of very hard cataracts one may sometimes see a decided rotation of the lens on its sagittal axis, which of course indicates a very loose connection between the lens and its capsule. The exit of the lens is extremely easy; lenticular remnants are removed in the usual way by means of a spatula. Thirty-four cases were operated upon in my hospital by this method. Four of them are excluded from the series. (*a*) A cataract with opacity of the capsule, in which, although peripheral capsulotomy was done, after extraction of the lens the capsule was seized with the capsule forceps and removed; healing perfect with perfect sight. (*b*) Cataract with a high degree of myopia and complicated with choroiditis. Healing normal without secondary cataract; ophthalmoscopic picture perfectly clear; extreme ectasia posterior, and choroiditis at the macula. Vision was much improved as compared with previous condition,—as good as could be obtained taking into account the lesion at the macula. (*c*) Cataract with congenital amblyopia. The operation was desirable because the other eye was blind from detachment of the retina. Healed kindly; fundus clearly visible; vision as good as before development of the cataract. (*d*) Cataract with superadded chronic choroiditis still in the inflammatory stage. The other eye was blind in consequence of an operation for cataract which had been done at the patient's home. Course of healing good; improved vision; still under treatment.

For purpose of comparison, then, we have thirty cases, of which there received:

(*a*) $V = \frac{1}{6}$, and better	26
(*b*) Secondary cataract	4

No loss.

In the university clinic during the first six months of 1886 peripheral capsulotomy was done by me fifty-nine times. Two cases must be excluded from the series on account of great opacity of the vitreous, which in one case surely, and in the other in all probability, existed before the operation. This gives us fifty-seven cases, of which there received:

(*a*) $V = \frac{1}{6}$, and better	43
(*b*) Secondary cataract	13
(*c*) Loss	1

Two of those with secondary cataract had $V = \frac{6}{36}$, but did not read connected type in a satisfactory manner, due probably to awkwardness on their part.

Taken together, we have eighty-seven cases.

(*a*) $V = \frac{1}{6}$, and better	69 = 79.3 %
(*b*) Secondary cataract	17 = 19.6 %
(*c*) Loss	1 = 1.1 %

The circumstance is a little remarkable that with peripheral capsulotomy, secondary cataract is not only not more but even less frequent than in central laceration of the capsule. In the latter pains are taken to remove the capsule from the pupillary region, while in the former it is allowed to remain undisturbed, and it is really surprising how transparent the two layers of capsule are when superimposed. They are clearly visible under focal illumination, but since they contain no wrinkles or elevations, they do not disturb either vision or the clearness of the inverted image.

I think that Knapp has dwelt a little too much upon the necessary frequency of after-operations in peripheral capsulotomy.

Among the above sixty-nine cases with satisfactory result there are who have:

$V = \frac{1}{2}$	4
$V = \frac{1}{3}$	14
$V = \frac{1}{4}$	20
$V = \frac{1}{5}$	9
$V = \frac{1}{6}$	4

I hold that it is not necessary to do an after-operation when visual acuteness equal to $\frac{1}{3}$ has been obtained; a patient may be satisfied with $V = \frac{1}{4}$, the majority of them are satisfied with $\frac{1}{6}$. Furthermore, diminished visual acuteness is not always dependent upon opacities in the pupillary region but may be attributable to irregular corneal curvature in some cases. Finally discission of the capsule may be done in three or four weeks after the extraction, when the course of healing has been normal.

There is no essential difference as to the frequency of secondary cataract, or as to visual results, between the method of opening the capsule as practised by v. Gräfe and peripheral capsulotomy, but there is one important circumstance in favor of the latter. In the Gräfe method I have found iritis in one half of the cases, though it is true the inflammation was slight, simple adhesion of the sphincter angles, and isolated points along the pupillary margin, which did not in any measure affect the sight. Secondary cataract, on the contrary, is almost constantly complicated with iritis when the capsule is freely torn in the pupillary region.

In peripheral incision of the capsule it is very different, iritis in these cases being very rare, even though there be secondary cataract.

I do not believe that the incarceration of bits of capsule in the corneal wound, which easily occurs in Gräfe's method, is quite so bad a thing as it is reputed to be. I have seen it so often in entirely normal healing that I am unable to look upon it as such a destructive accident. The rarity of iritis, however, in peripheral incision of the capsule, proves in fact that when the capsule has been freely lacerated in the pupillary space, the rolled-up tips and corners whenever they touch the margin of the iris do give rise to inflammatory reaction and adhesions. Even though a slight iritis may not influence the visual result for the worse, yet a secondary cataract with adherent iris presents a problem by no means as pleasant as when the pupil is free from adhesions. And what assurance have we that an iritis springing up shortly after the operation may not be the starting-point of a destructive irido-choroiditis?

The behavior of an eye after operation does not always afford undubitable evidence as to the course of healing. Pain is often caused simply by a collection of tears in the conjunctival sac, and disappears upon changing the bandage and washing the eye. Dense secondary cataract may succeed an extraction wherein the healing has been undisturbed, while with other cases, in which spasmodic closure of the lids and extreme upward rotation of the eyeball has effectually prevented any examination of the eye at all, in the end every thing has been found to be all right. Swelling of the lids and chemosis of the scleral conjunctiva are generally evidences of severe inflammation of the interior of the eye, yet they sometimes occur in cases which finally terminate normally. Individual predisposition seems sometimes to come into play here. At least I have seen patients in whom both eyes had been operated upon, and in whom about the second day after the operation the lids on both sides were so swollen, and there was so much inflammatory chemosis of the ocular conjunctiva, that it protruded between the edges of the lids in masses, and yet all went well without any signs of iritis. I do not mean to say that there was no iritis, but only that by the use of atropine synechiæ were prevented. In von Gräfe's method atropine is the only remedy which is of value anyway, in the after-treatment; in severe iritis a bandage moist and warm sometimes has a soothing effect upon the pain. The days in which it was deemed necessary to resort to phlebotomy, or at least to apply a leech or two in every extraction, fortunately are past.

Two cases have been placed among the losses, which would, according to the usual custom, have been classed with the good results, since they had $V\frac{1}{10}$ at the time of discharge. Eight cases would have been classed with the insufficient results because they were discharged with good perception of light, and a fair indication that an after-operation would give them satisfactory vision, which result was in fact realized in some, yet it was not permanent. Only six were discharged as hopeless, and one of these was a very rare case of choroidal hemorrhage immediatety after the operation.

Five losses were occasioned by infection of the wound. Antiseptic precautions were observed in all cases, but corrosive sublimate alone seems to be in any degree trustworthy. A stronger solution than 1 to 5,000 is not well borne. I therefore consider it of importance that this weak solution should be used for a long time. The evening before the operation I usually cause the conjunctival sac to be thoroughly washed out, having the patient with his head dependent, so that the superior cul-de-sac may be the more certainly reached by the sublimate-solution. A pad moistened with the sublimate solution is then fastened over the eye and kept there until the time of the operation. The instruments are of course disinfected, and immediately before the operation the conjunctival sac is again washed out with the sublimate. Since this method of procedure in my private hospital I have had no case of wound infection, but in the university clinic some isolated cases have occurred—in a much greater number of patients it is true, still under much less favorable circumstances; the case of loss in the series with peripheral capsulotomy, for example, belongs here.

The greater number of losses were occasioned by irido-choroiditis, when the introduction of the sublimate as the antiseptic yielded a very unlooked for result. The irido-choroiditis declared itself at once in 7 cases, in 4 cases between the second and third week, and 4 cases were discharged with tolerably good sight.

It may be useful to report briefly a few of these cases.

Mr. M., 60 years of age. Cataracta matura, right. Operated upon Oct. 3, 1881. Capsule opened with cystotome; complete evacuation of the lens; while disengaging the iris, caught in the temporal angle of the wound, a slight loss of vitreous with immediate filling of the anterior chamber took place. During the process of healing there was swelling of the scleral conjunctiva and the borders of the lids; pain particularly at night, and slight haziness of the cornea, moderate atropine mydriasis. On Oct. 30th, with $+ 11$ D $V = \frac{1}{4}$, and with $+ 15$ D, reads 0.8, which, for statistical purposes, is a perfect result, but the swelling of the lids, pericorneal injection, profuse lachrymation, etc., still continued, and when about the end of January, 1882, the patient presented himself again, the pupillary region, although but little diminished in area, was closed by a new-formed membrane;

the iris pushed forward in the form of a shield. The fingers could be counted at a distance of ½ meter. An iridotomy was without result. The lips of the incision did not gape in the least.

Among the losses there is still another case which is worthy of remark on account of its rarity :

Miss L., æt. 77. Cataracta matura, right. Motion of the hand, at 1 metre ; projection correct. Operation without accident Feb., 1883, under undisturbed narcosis (immediate posterior capsulotomy). After the bandage had been applied and while the patient was lying quietly on the operating bed, the vitreous suddenly gushed forth from under the bandage. In the evening the pupil was narrow, the anterior chamber empty, the wound gaping. The further progress of the case was without noteworthy indication of inflammation. March 2d the cornea was clear ; iris normal, on its lower sector a narrow strip of blood stain ; pupillary region not transparent opthalmoscopically ; no perception of light.

The posterior capsulotomy cannot be charged with this result, but we had to do with a choroidal hemorrhage occurring immediately after the operation, producing detachment of the retina and expulsion of the vitreous.

I had met just such a case before, in which not only the vitreous but also a profuse hemorrhage gushed from the wound. Such cases are very rare, and are not to be diagnosticated in advance. The predisposition may exist in both eyes.

Finally, another case may be mentioned because of its rarity, in which the eye operated upon is not to be considered as lost, as there is a possibility of bettering the sight by an after-operation ; iritis appeared however in the other eye, which may be considered as sympathetic.

Mrs. F., æt. 66. Cataracta matura, left. Operation Nov. 6, 1883, without accident. Capsule opened with the capsule forceps. In a short time a mild iritis appeared, without any particular disturbance to the healing, accompanied, however, with a posterior adhesion of the iris along the lower border of the pupil ; at the end of the second week violent iritis. On Jan. 9, 1884, with + 12 D V = $\frac{1}{10}$. Pupillary region for the most part clouded with a thick stain-like secondary cataract. Iridotomy without result. On Jan. 26th, iritis appeared in the right eye, until now sound, save some opaque striæ in the lens periphery ; some isolated dots appeared on Descemet's membrane, and within four weeks vision had been reduced to $\frac{1}{24}$. The treatment consisted simply in instillation of duboisin, atropine not being well borne, lukewarm applications, etc. I saw no reason which would warrant the enucleation of the left eye, especially since its vision was not entirely lost. The iritis in the right eye was obstinate, as is usual in such cases, but got entirely well. In the beginning of July, 1884, vision was $\frac{6}{12}$, as it was before the inflammation. There were a few adhesions ; fundus normal. The eye remained well, and on May 1, 1885, the condition above noted remained unchanged. Inasmuch as the left eye had suffered an injury, (extraction) two and a half months before, the disease in the right eye might be called a sympathetic irido-choroiditis, and it is therefore the more important to notice that the inflammation subsided under simple treatment, without enucleation, the patient going about the while.

It is self-evident that extraction does not protect an eye against later manifestations of disease, for as a matter of fact I have seen all the commoner affections in eyes in which extraction had been done. Following is a case in which blindness was caused by an irido-choroiditis that appeared, however, so long after the operation was done, that any causative relation is doubtful.

Mrs. B., æt. 69. Mature cataract, left. Nucleus small, large ; swollen cortex ; anterior chamber shallow, entirely normal. Operation March 20, 1882. After complete evacuation of the lens, posterior capsulotomy, anterior chamber filled at once. Slight loss of vitreous. Some blood entered the anterior chamber from the conjunctival flap. The course of healing was attended with nothing abnormal, save some slight turgescence of the episcleral vessels.

April 20th.—The following conditions were noted : Pericorneal injection still present ; atropine mydriasis good ; iris in position, upon its upper portion still a small red coagulum. The pupillary area, on focal illumination, clear, ophthalmoscopically very much clouded ; vision with + 11 D, $\frac{1}{36}$. The diffuse cloudiness of the vitreous could only be attributed to choroiditis, and with that diagnosis the patient was sent home.

About the middle of June, 1883, she came again. Pupillary region diminished, distorted in its upper portion and covered with a whitish membrane, the margin of the pupil for the greater part adherent. Atropine produces but little dilatation ; with + 11 D V = $\frac{1}{36}$. Iridotomy : the iris was cut from the pupillary border downward and outward and inward to near its insertion. The incisions gaped widely, and at the end of ten days with + 10 D, vision was $\frac{6}{18}$, inverted image clear and normal. How long this condition of affairs continued I do not know. During my vacation, in Aug., 1885, the patient returned. My assistant and substitute noted atrophy of the globe, no perception of light.

Inasmuch as choroiditis was diagnosticated after the first operation, it is fair to presume that, from some unknown cause, she suffered a relapse, and blindness was the result.

The following is a similar case :

Mr. P., æt. 62, was operated in October, 1881 (immediate posterior capsulotomy). When discharged in November, he saw with + 11 D $\frac{1}{3}$, and with + 16 D he read 0.75 with ease. The eye remained in good condition until November, 1882, when a severe inflammation declared itself. Eight days after its beginning the patient presented himself with strongly-pronounced pericorneal injection, cornea and iris normal. Ophthalmoscopically, the vitreous was not transparent, particularly in its lower part, where there was a dense grayish opacity. Fingers could be counted at $\frac{1}{2}$ metre. The larger part of the visual field was wanting upwards and inwards. Treatment without result.

In April, 1883, I saw the patient again. There was a slight hemorrhage in the anterior chamber. The left eye was normal, with some isolated opaque striæ in the lens. Evidently, in this case, there was an acute choroiditis, with detachment of the retina, which had no connection with the operation.

The ordinary form of detachment of the retina, which is usually associated with myopia, also occurred in several cases.

Mr. St., æt. 50, came under treatment in Jan., 1881, on account of long-standing linear opacities at the posterior pole of the lens. Both eyes highly myopic with small posterior ectasia. In Nov., 1881, the cataract in the left eye was completely ripe, operation and course of healing normal, with good vision. An examination in June, 1882, showed him to have vision $\frac{6}{9}$ to $\frac{6}{6}$ with + 6 D. In Oct., 1884, the patient presented himself again. He had observed a diminution of vision in the left eye for two months. He then had vision of only $\frac{1}{4}$ with + 15 D, and read 0.75 with difficulty. No defect in the visual field, yet there was detachment of the retina downwards. In the right eye, meantime, the lens had become completely opaque. Movements of the hand were seen at a distance of $\frac{1}{2}$ metre. An examination as to perception of light, by means of the ophthalmoscopic mirror, discovered no defect of the field; small quantities of light were perceived in all directions, but projection was faulty.

From the nature of the case, detachment of the retina was very probable, but could not be proven. Normal extraction and course of healing (capsule opened with capsule forceps); suspicion of detachment confirmed. In an examination in May, 1886, it was found that he had a visual acuteness of from $\frac{1}{18}$ to $\frac{1}{12}$; media clear; ophthalmoscopic image distinct; detachment downwards, reaching to the disc.

An interesting but sad case is the following:

Mr. K., 45 years old, had had, for a number of years, complete opacity of the lens of the left eye, perception of light and projection normal. The right eye is myopic, with irregular opaque striæ at the posterior pole. Operation May 28, 1883. A large piece of the capsule was removed by means of the capsule forceps. The lens emerged smoothly and entire; in replacing a piece of iris caught in the medial angle of the wound, a slight escape of vitreous occurred. Course of healing normal. On June 16th, he saw with + 4 D $\frac{5}{12}$, and with + 8 D he read 0.4 to 0.3. The pupil completely dilated; no synechiæ, refractive media entirely transparent without a trace of opacity; ophthalmoscopic image clear; posterior ectasia about the breadth of the disc, with only slight atrophy of the pigment epithelium.

On July 3d I found perfect acuteness of vision with + 4.5 D, and with + 8 D he read 0.3 at 30 *cm*, but, to my horror, I found floating opacities of the vitreous, and in the upper and inner sector a small laceration of the retina, with beginning detachment. It was not until two days later that the patient became aware of his misfortune, showing that, although detachment of the retina usually makes itself known to the patient at once, *i.e.*, as soon as it approaches the posterior pole, it may have existed unobserved at the periphery.

There is yet to mention a case of retinal hemorrhage which occurred three and a half years after an operation normal in every respect, and led to complete blindness, with atrophic degeneration of the nerve.

One of the most remarkable cases, namely, an acute glaucoma, is the following:

Mrs. K., æt. 70, has had for years a mature cataract on the right side, and in November, 1882, came under treatment for a central bullous keratitis, with iritis of that eye (left $H = 5.50$ $V = \frac{6}{9}$). The iritis healed with two tongue-like synechiæ above and one broader one below. Some corneal opacity was left in the centre.

In June, 1885, the right eye was operated upon. Every thing went well. At the time of discharge with + 12 D her sight had $V = \frac{1}{4}$, with + 16 D she read 0.75. If it had not been for the central opacity of the cornea her sight would have been still better. The sphincter angles are free. The broad adhesion of the lower pupillary border still persists; ophthalmoscopic image distinct. Feb. 8, 1886, the patient came to see me because of pain in the right eye, which had persisted for some weeks. There was only moderate pericorneal injection and diffuse cloudiness of the cornea; most dense in the centre where there were some small infiltrations. Vision corresponding to the corneal opacity was $\frac{1}{12}$ to $\frac{1}{18}$, with + 13 D. I considered it a relapse of the former kerato-iritis, and treated it accordingly. As the patient lived out of town, I did not see her again until March 25th. Haziness of the cornea, with punctate infiltrations and some superficial loss of substance, still persisted.

March 25th.—The cornea was so far clear that an ophthalmoscopic examination was possible. I found, to my astonishment, that there was a deep excavation of the nerve extending to its margin, with spontaneous arterial pulsation. On account of the spasm of the lids which set in every time the eyes were touched, the tension could not be ascertained; but after anæsthesia with cocaine I found decided increase of tension in the right eye. Sight was lost. Only movements of the hand could be distingnished in the outer and upper sectors.

I had not supposed it possible that an eye which a few months before had been the subject of a broad iridectomy could become blind through an acute glaucoma. It contradicts the theories which would explain the manner in which iridectomy cures glaucoma; but the most vulgar fact is more acceptable to me than the most brilliant theory which cannot be made to agree with said fact.

The other eye, which meantime had become ready for operation, was operated upon by me in the university clinic (peripheral capsulotomy), with normal healing and good sight as the result.

The ophthalmoscopic appearances July 13, 1886, were as follows: Left optic nerve normal; small central depression. Right optic nerve nearly white; excavation extends to the margin on all sides, with distinct bending of the vessels. No perception of light.

I shall only refer to one intraocular complication, which, however, is not a contra-indication, but rather an incentive to operation, namely, opacities of the vitreous. Treatment can be better directed after than before operation.

Mr. N., æt. 66, blind in the right eye since his thirteenth year from injury, atrophy of globe. Right eye has always been near-sighted, and, in addition to some opacities of the cornea, there is mature cataract.

Operation Nov. 7, 1883 (capsule forceps), normal healing.

Nov. 29th.—No trace of iritis; pupillary region on focal illumination clear; ophthalmoscopically, however, almost non-transparent; background cannot be seen on account of dense opacities of the vitreous; vision scarcely $\frac{1}{36}$; visual field complete. A 2 per cent. solution of iodide of potassium was ordered to be used several times a day as an eye-wash.

Feb. 13th.—Slight opacities of the vitreous still remain, with + 7 D he sees $\frac{6}{18}$, and with + 12 D reads 0.5. Ophthalmoscopic image distinct; slight posterior ectasia about half the size of the disc.

In all probability the opacity of the vitreous existed before the operation. I mention this case, however, because I have repeatedly, of course not always, observed a clearing up of opacities of the vitreous in aphakial eyes after the use of the solution of the iodide locally. The iodide may just as well be introduced into the vitreous by absorption through the cornea, when the lens is absent, as by internal administration when the lens is still in the eye. I have not been able to convince myself of the value of the iodide in such cases.

Cataracta complicata and cataracta nigra are closely related. I have found the latter, as mentioned in my Handbook,[1] only in myopic eyes; the myopia is generally associated with choroiditis, even though it may not affect the macula. Arlt[2] also has demonstrated the relation between myopia and cataracta nigra. How this connection comes about we do not know. The greater number of cases of cataract in myopia of high degree, with or without choroiditis, are not to be distinguished from the usual form.

Another complication of great practical importance is dacryocysto-blennorrhœa. I do not usually lose any time with preparatory treatment by means of the sound. A day or two before the operation I open the sac from the outside, and fill it with cotton to check the bleeding and hold the wound wide open. Then an iodoform pencil is introduced into the wound, and renewed once or twice a day. The same treatment is kept up during the course of the healing after extraction, and I have never seen infection ensue.

If we designate with the term ripe that condition of the cataract in which the lens is entirely opaque, we may accurately describe the pathological-anatomical condition; but the clinical conception does not require so much. The question at issue is this: Under what circumstances is it permitted to suppose that the lens may be completely removed, with no portion of it left behind? That a complete opacification of the lens is necessary for the attainment of this end, is a proposition which has been proven false.

Among the cataracts which may be extracted before opacification is complete, the nuclear cataract ranks first—that is, cases in which the opaque, generally yellow or brown nucleus, is sharply defined, either upon focal or ophthalmoscopic illumination, against the transparent cortex. Of course the cortex does not remain permanently transparent. Nuclear cataract develops generally not until after the 50th year; there are, however, exceptions. I have seen nuclear cataract in a child less than a year old, and after discission the nucleus floated around in the anterior chamber like a pea. Absorption occurred just as rapidly as in any case of congenital cataract. I have had some cases in persons of 20 or thereabouts, which were operated upon by discission, with good result. It is true the course of healing was a little more protracted than in children, but the possession of a round, movable pupil is well worth a few weeks' waiting and patience. In persons of more advanced age, one of the earliest symptoms of nuclear cataract is the occurrence of myopia in emmetropes, or presbyopes; they are rejoiced to find that they can read without glasses; they have gotten their so-called second sight.

---

[1] Fifth edition, 1885, p. 354.

[2] *V. Gräfe's Arch.*, vol. xxxi., sec. iii., p. 9.

In the beginning the nucleus can be distinguished from the cortex only by its greater refractive power. With a plane mirror the boundary is seen as a sharply defined line. It should be remarked in this connection that in some cases a yellowish-brown reflex may be observed on focal illumination, yet a sharply defined line is not perceived, because the nucleus is too large—its border, especially, when the pupil is not widely dilated, is hidden by the iris. If the nucleus becomes opaque gradually, the visual disturbance is considerable, for even though the nucleus is small, it yet fills the whole area of the pupil, while the cortex is and may remain transparent for years. Under these circumstances longer waiting is without reason. As soon as the vision is so reduced that the patient can no longer find his way about, extraction may at once be done. Even when the cortex is so transparent that after dilatation of the pupil the background of the eye may be distinctly seen, we may confidently expect that the whole lens will come out as a single mass, and without leaving any remnants behind. Because the same process of hardening which preceded opacification in the nucleus has taken place in the cortex, so also the cortex before it becomes opaque will become so hard that it may be loosened from the capsule, and easily expelled.

These cases are so frequent that it is hardly worth while to illustrate them with examples. I will introduce, however, one case, which does not exactly belong here, because the nucleus was not at all so sharply defined as in true nuclear cataract.

Mrs. M., æt. 73, has been near-sighted for a long time, with 16 D sees $\frac{1}{36}$, No. 1.75 is read with difficulty at about 3 *cm* on focal illumination. Some linear striæ are seen in the anterior corticalis, and at the periphery. In the centre of the lens is seen a small grayish-brown reflex, not sharply defined, and coming from the deeper portion ; with the ophthalmoscope likewise, a distinct definition of the nucleus cannot be made out. On the other hand, besides the opacity in the lens, numerous opacities in the vitreous are visible, together with immense posterior ectasia and choroiditis at the macula lutea. The section proved too small, on account of the unusual breadth of the arcus senilis ; the lens was therefore expelled with some difficulty, as a tough, jelly-like mass, and only by means of counter-pressure on the upper lip of the wound. Peripheral capsulotomy was done, course of healing normal. Three weeks after the operation, emmetropia, V $\frac{1}{12}$ and with + 9 D 0.8 was read with difficulty, which was certainly all that could be expected when the disease at the macula is taken into consideration. The pupillary border is entirely free, on focal illumination a fine transparent veil of tissue is seen in the pupillary area, the inverted image is distinct, great posterior ectasia, choroiditis at the macula, opacities of vitreous.

This case of extraction of a lens only slightly opaque leads naturally to the form of incomplete cataract now to be described.

A distinction must be made between certain forms of cortical opacity of the posterior pole and true nuclear cataract. The opacity of the cortex sends back a grayish reflex, it is true, which involves the centre of the lens, but on dilatation of the pupil, neither on focal and still less upon ophthalmoscopic illumination, can a sharp line of definition be made out between nucleus and cortex. Generally, also, there are a greater or lesser number of linear striæ in the region of the æquator. Under these circumstances we can usually, but not with the same certainty as in true nuclear cataract, reckon that the lens will come out entire as a single mass. A few cases may serve as examples.

Mr. G., 56 yrs. old. On focal illumination an opacity about 4 *mm* broad is seen near the middle of the lens, showing a gray reflex, but not with sharply defined borders, before it some barely recognizable indication of the stellate lenticular figure. In the anterior cortex in the lower part, near the border, a few short radiating opaque lines, the opacity of the posterior cortex is more dense, and lies like a thin, tolerably regular layer immediately upon the posterior surface of the lens. With the exception of these opacities, the lens is entirely transparent, and the color of the fundus shows through it ; details of the fundus cannot be made out. Extraction with peripheral capsulotomy good, delivery of a rather small nucleus, together with the cortex. The pupil immediately afterwards appeared black, and no opacities were visible. Three weeks afterwards with + 10 D he saw $\frac{6}{12}$, and with + 15 D he read 0.5 at 20 *cm.* Inverted image clear and normal.

Mr. K., æt. 54. Has always been short-sighted ; has noticed diminution of sight for a year ; counts fingers at 1 metre. On dilatation of the pupil a grayish opacity about the centre of the lens is seen with oblique light, but there are no defined limits. The anterior portions transparent ; the opacity thickest posteriorly. Ophthalmoscopically the denser opacity is only seen at the posterior pole ; it gradually disappears as the lens border is approached, without there being any line of demarcation. The periphery of the lens is transparent ; isolated striated opacities in the cortex. The disc is seen dimly. Extraction in November, 1885 (capsule opened with capsule forceps). The lens came out smoothly and entire ; good healing without secondary cataract, with convex cylindrical glasses. $V = \frac{1}{4}$.

It is worthy of remark as regards the opacities which begin in the posterior cortex, that, in spite of the small area involved, they occasion very material disturbance of sight, for, be it remembered, the pupillary area at the posterior pole is considerably smaller than at the anterior pole. Therefore, not infrequently there is a striking difference between the ability to make out test-type and the power to read connected print. The latter is often read with much more difficulty than one would have supposed from the tests made with the former. One should, however, not be misled into the supposition that there is some intra-ocular complication because of this condition.

A third form of cataract should be mentioned here, in which there are irregular linear and punctiform opacities contained in transparent lens-substance, and lying generally in the cortex. These opacities develop sometimes between the twentieth and thirtieth year, usually later, create a good deal of visual disturbance, and are apt to remain a long time without change. Not infrequently capsular cataract is associated with them.

Miss M., 75 years old. Disturbances of vision for ten years, or longer. Counts fingers at 1½ metres. In the pupillary region points and lines are observable immediately under the capsule. Upon mydriasis a few grayish striæ are visible in the anterior cortex, radiating into the pupillary region. In the posterior cortex they are more numerous, and reach almost to the pole, which is occupied by an irregular opacity. The denser masses of striated opacities are found at the periphery. The lens is withal sufficiently transparent, so that the posterior cortical layers can be distinctly seen on oblique illumination; the nucleus is not defined. With the ophthalmoscope numerous transparent spaces are seen between the opacities, but the background is not visible. $V = \frac{1}{36}$. Extraction April, 1883 (capsule forceps). The lens (about 8 *mm* broad) came out as one mass with but little difficulty. The region of the pupil immediately afterwards was black. Three weeks afterwards, with $+ 10$ D $V = \frac{1}{3}$; inverted image normal and distinct.

My observations agree completely with those of Alfr. Gräfe,[1] that in certain forms of incomplete cataract, the lens may, without further ado, be removed. Consequently the question suggests itself, when do the indications for artificial ripening after Förster's method begin? In true nuclear cataract and the other forms of incomplete cataract which have been described in the foregoing, Förster's method does not recommend itself, since, while the transparent cortex disengages itself easily and completely from the capsule, artificial ripening brings all the ill consequences of soft cataract with it. In senile cataract the shining sectors of the softened cortex directly under the capsule show that anatomically, indeed, the cataract is ripe, but the softened masses stick to the inner surface of the capsule, and are therefore difficult to remove, or remain behind.

The indications for artificial ripening are present, then, I think, when neither on account of the patient's age nor on the ground of the long existence of the opacities can we presume that the necessary density of the lens has been reached.

---

[1] *V. Gräfe's Arch.*, Bd. xxx., S. 211.

A few small striated opacities in the region of the posterior pole, in an otherwise perfectly transparent lens, may incapacitate a man for work in the very heyday of his life, and that we are not under the necessity of postponing the matter *ad calendas graecas* we are in duty bound to thank Förster.

For the success of this method, artificial ripening, it is necessary that there should be a hard nucleus, and that the patient shall at least have passed his thirtieth year; then it succeeds without exception, even without iridectomy, as proven by myself, as well as Meyhöfer.[1] I have resorted to this method to prepare the way for flap extraction without iridectomy.

That preparatory iridectomy as a means of artificial ripening is not in any way to be compared with Förster's method, requires, indeed, but few words to establish. V. Gräfe[2] has observed that sometimes unripe cataracts matured with striking rapidity after a preparatory iridectomy, but this is an exception. I have seen cases enough in which an iridectomy had been done for the purpose of hastening a cataract to maturity without any effect whatever.

I also agree with Gräfe in that a preparatory iridectomy is very seldom indicated, and those who resort to it as a matter of routine generally do more than is necessary. I find such indication only when luxation of the lens, weakened zonula, or fluidity of the anterior portion of the vitreous can be demonstrated. In such cases it is an advantage to be able to proceed with extraction immediately after the completion of the corneal section.

Finally, I conceive it my duty to the memory of v. Gräfe to assert his rights on this subject. Preparatory iridectomy is the heritage of Gräfe's genius, and it is a startling proof of the loose manners which prevail in the literature of to-day, that this method should have been christened with the name of Mooren. As long ago as 1856 v. Gräfe[1] stated the indications governing the combination of iridectomy with the flap section, and in regard to preparatory iridectomy, he expressed himself as follows: "That this method, from the standpoint of security and prophylaxis, would find its defences." That v. Gräfe, as a matter of fact, not only proposed preparatory iridectomy as a possibility, but actually did it when he considered it indicated, is shown by the circumstance that in 1862 he published the fact that immature cataracts ripened in a surprisingly brief time when he had made an iridectomy some time before extraction. In the earlier part of 1863 v. Gräfe,[2] in consequence of this assumption of precedence on the part of Mooren, found it necessary to say: "For those who have only one eye, I have *for several years* adopted this procedure (preparatory iridectomy) as a general or routine method."

---

[1] Report on the work done in his eye-clinic for the years 1884 and 1885.

[2] *V. Gräfe's Arch.*, 1862, Bd. viii., 2, S. 258.

Mooren had, in a treatise which appeared in 1862 ("Diminished Danger," etc.), profited by v. Gräfe's idea, without having so much as by a single word indicated the source whence he obtained it. V. Gräfe, in his amiable and unpretentious way, entered his protest in vain. The crowd only hears the trumpet blast.

If there be to-day a tendency toward a revival of the flap section, it is well to remember that the movement comes from France, and is not devoid of a certain patriotic feeling. We too remember, with pleasure, the improvement which was made on the method of Daviel, by Beer and G. A. Richter, toward the end of the last century. The preservation of a round and movable pupil is indeed an end worth striving for. The question is only, under what circumstances in senile cataract we may dare reckon upon the attainment of this end, and what sacrifice we impose upon our patient when we do not succeed? What there is to be said upon the subject has frequently been said. The wide gaping of the wound, which is required for the delivery of the lens, has as its natural sequence a corresponding gaping during the course of healing. Prolapse of iris, as Critchett once so neatly put it, at Heidelberg, is the "bête noire" of the flap section, and that prolapse of iris is ten times worse than an iridectomy, few indeed will doubt. Moreover, iridectomy, conjoined with the flap section, is now unnecessary; every advantage is on the side of v. Gräfe's method. We would also have to exclude all those as not fit subjects for this method who, from any cause whatever, could not lie for a long time in bed. Enough to say that the majority of cases of senile cataract are better adapted to the method of v. Gräfe.

---

[1] *V. Gräfe's Arch.*, Bd. ii., S. 248.

[2] *Klin. Monatsblätter f. Augenheilk.*, 1863, S. 154.

In a small number of selected cases in which I had operated upon one eye, according to v. Gräfe's method, I did extraction downward, making the flap section. After completion of the operation I instilled eserine; the patients remained lying quietly for about half an hour until the pupil became small, when they were removed to the bed. Eserine was used for several days. In spite of all this Critchett's "bête noire" did not remain away; in several cases, although there was no prolapse of iris, the latter became adherent to the internal surface of the wound, and even in cases in which there was healing with a round pupil, the visual acuteness was not better than in the other eye which had been operated upon according to v. Gräfe's method. The principal course of diminished vision is the irregularity of curvature of the cornea, produced by cicatricial contraction, which is, if any thing, greater after the flap section than after v. Gräfe's method.

Further, if the classical triangular knife has been the best instrument for more than a hundred years for the flap section, and since we have now come to the point of abandoning the linear incision in senile cataract, and in its place have substituted the small flap section, why not use the knife best adapted to that form of section? V. Gräfe's small knife was especially invented for the linear incision; it has the advantage that it may be easily turned while making the section, but each rotation of the knife means a notch in the course of the wound. In order to insure the greatest possible evenness of the incision, I use a knife which is two-edged at the point, and 3 *cm* from the point is 5 *mm* in width,[1] and for the rest possesses all the qualities that constitute a good cataract knife.

The conjunctiva should be fixed by means of a fixation forceps at the lower part of the eye, and the forceps handed over to an assistant. The operator then seizes the conjunctiva with a second forceps, without a lock, in the horizontal meridian, and transfixes with the knife at the margin of the cornea, exactly in the direction and position which he desires to maintain during the whole of the section.

The old-time direction to direct the point of the knife to the centre of the pupil, after effecting the puncture, in order thereby to obtain a larger canal of the wound, has no practical value. In making the counter-puncture this manœuvre cannot be maintained, and the extent of the wound is perfectly under our control by laying the chord of the incision at any required distance from the apex of the cornea. After the puncture has been made the knife is held with its back in a straight line 3 to 4 *mm* under the apex of the cornea, and is pushed slowly forward until the opposite side is reached, while the flat of the knife is held unchanged as the instrument advances in the corneal margin. As soon as the point of the knife has reached the nasal side, the handle is depressed towards the temple and the eye is rotated outwards with the fixation forceps, so that the knife shall not pierce the skin at the inner canthus. It should not be forgotten, during the entire time occupied in making the incision to so use the back of the knife as not to allow the aqueous to escape, and when finishing the incision it should not be done with a jerk, but slowly; the bridge of cornea at the last may be divided in the withdrawal of the knife. If desired a conjunctival flap may be formed in this method of incision.

The incision is more difficult in this method than with a smaller knife, but the wound is smoother and more regular.

---

[1] For the sake of completeness, I will say that Arlt (*v. Gräfe's Arch.*, Bd. xxxii., 4, S. 252) recommends a reduced Beer's knife, which, 3 *cm* from the point, is 2 to 3 *mm* broad. The knife which I use is twice as broad.

By making the incision a little larger so that its base line lies 5 *mm* below the apex of the cornea, it will suffice in many cases for extraction without iridectomy. I have so far operated but little in this manner by flap incision upwards, without iridectomy, because the cases adapted to such procedure are not frequently met with; at any rate the experiment commends itself on its merits, but the cases must be selected. Also in opening the capsule one must endeavor to adapt the method to the conditions existent. In hard cataracts, including the before-mentioned incomplete cataracts as well as in the Morgagnian, peripheral capsulotomy is best. If the cortex is strewn with spokes, and sectors with a silken sheen lying just under the capsule, it is probable that the cortex has been converted into a tenacious mass here and there adherent to the capsule, hence a free opening of the capsule with the cystotome is better; and lastly if capsular cataract be present, the capsule forceps may be preferable.

In ripe cataracts in younger persons, up to about the age of thirty, the linear method of v. Gräfe is indicated. V. Gräfe knew well enough that the section with the lance knife, which he recommended in these cases, was not a linear section, but these cases were just the ones which afforded a test of the highest character for the real linear section. Since the softened lens of a young person may be easily delivered through a wound having an inner length of 5 to 6 *mm*, no difficulty at all is experienced in obtaining a small but truly linear section with a narrow knife.

It is only necessary that all the time while making the section, the knife be so held that the plane of the blade shall pass through the centre of curvature of the cornea. The entire section of course lies in the transparent cornea from 2 to 3 *mm* below its upper border. It is noteworthy that this incision has the same quality as the flap section—it gapes very easily, as well during the delivery of the lens as during the course of healing. This, however, is on no account an advantage. These soft lenses have by no means a uniform consistency, some portions are always less soft than others, and do not come out so readily. If we then endeavor to expel the retained portions by means of gentle pressure, the consequence of this wide gaping is that vitreous may present in the wound and bring the operation to an end. Furthermore, during the period of healing the iris may fall into the wound and become incarcerated. In consequence of these accidents I have naturally abandoned the linear incision, even here where it is generally practicable.

I make use of a broad lance-knife, such as was used by Critchett for his cataract operations.

I introduce the knife about 1 *mm* below the upper border of the cornea and push it gently forward parallel to the plane of the iris until its point is very near the lower angle of the iris; the knife is then slowly withdrawn. Exactly the circumstance that the internal wound is less peripheral than the outer, and thus therefore the wound of the cornea is broader than it is in the linear incision, is the cause why the wound gapes less easily, which is an advantage, not only so far as the delivery of the lens is concerned, but also as to the process of healing.

After opening the capsule the fixation forceps had better be given to an assistant, and while gentle pressure is used from below upwards, at the same time with a second spatula exert slight pressure on the upper lip of the wound to produce gaping and easier expulsion of the lens.

If it be wished to induce *artificial ripening*, the best method is to perform a discission a few days before the extraction.

For zonular cataract also, a similar method is to be recommended. It is not in every case of discission of lamellar cataract that there is rapid and considerable swelling of the cortex. Often the swelling and opacity are slight, the absorption follows slowly, and after from four to six weeks it ceases entirely, and the discission must be repeated until finally at the end of three to four months the entire lens is disposed of. In other cases, however, great swelling immediately succeeds the discission, whether the opening in the capsule be large or small, the anterior chamber is filled with lens matter, sometimes even the posterior cortex together with the nucleus may be forced through the pupil, so great is the swelling, and generally in the course of a few days a condition of greater or lesser irritation ensues. It is best, however, not to wait for this, but as soon as the anterior chamber is pretty well filled with lens-substance, to do linear extraction, under full narcosis, of course, since the subject is generally a child whom we cannot trust to hold still. We cannot certainly always expect to remove the whole of the lens but much time is gained by the operation.

The principal point at issue in *zonular cataract is whether an operation is really necessary or not*, which can only be decided by very careful and repeated visual tests before the operation. It is indefensible to operate on children for zonular cataract before they have reached an age when the necessary tests of vision can be made. Any child can see enough for this in spite of a zonular cataract. It is also only by careful examination that one-sided congenital amblyopia, not by any means so infrequent in zonular cataract, can be excluded. If the vision is as much as $\frac{1}{6}$ or more, which is as much as is found in many cases of astigmatism, etc., then an operation is not indicated ; if the vision is so poor that it would disable the person from earning his living, then no choice is left but to operate, but the only practicable method is discission. Iridectomy is to be rejected absolutely in every case of zonular cataract ; the best that can be expected of it is a slight diminution of vision.

An iridectomy for optical purposes is based on fundamental error, inasmuch as the given optical conditions are not taken into account, and the entire transparent cornea is considered as of equal value. The central portion of the cornea only is useful for optical purposes ; the pupillary region, for direct vision. It is only necessary to examine the peripheral portions of the cornea—that is, the pupillary region in an optical iridectomy,—with a keratoscope, to be convinced how irregular and distorted the image is, and the catoptric error is naturally a dioptric error also. Similar conditions probably prevail in the lens. In zonular cataract there is another consequence to be taken into consideration, *i. e.*, the very uncovering of the transparent border of the lens may render the retinal images worse, because of the irregular refraction which must take place on the borders of the opaque parts of the lens. Added to this there is the greater visual disturbance consequent upon enlargement of the pupil, which always greatly exceeds the piece of iris cut out.

Quite exceptionally, one may sometimes be under the necessity of forming a pupil for optical purposes, in zonular cataract, and then iridotomy is by far the better method. Such a case was that of a woman of 37, who had for twenty years or longer obtained some poor improvement of vision by means of atropine, but had at last reached a state when atropine or any other mydriatic could not be borne. An iridotomy from the pupillary border to near the insertion of the iris, afforded her all the improvement of vision which atropine had given her. The advantage of iridotomy is this, that the pupil thus formed becomes so narrow toward the periphery that the irregular refraction is as much as possible avoided ; the refractive error at the border of the opaque portion of the lens of course remains the same as in atropine mydriasis.

The indication for iridotomy, the lens being present, is rare. I have always done the operation with the scissors, not with de Wecker's pince-ciseaux in which the axis of rotation lies about 5 *cm* from the beginning of the cutting edge, but with an English model in which the axis of rotation lies hardly 10 *cm* behind the rounded point. I have never wounded the capsule with this instrument.

In congenital cataract discission alone is the fitting operation. I have already mentioned that the operation will fail, when there is congenital amblyopia, *i. e.*, if there be congenital amblyopia and not amblyopia from disuse, which in my opinion does not exist at all.[1]

I have not been able to persuade myself of the value of iridectomy conjoined with discission, praised so highly by v. Gräfe ; discission loses thereby exactly the advantage which is its greatest recommendation, a round and movable pupil. Even though the pupil be narrow and not responsive to atropine, I have never seen any ill results from omitting the iridectomy.

---

[1] Klinische Untersuchungen über das Schielen. Berlin, 1881, S. 102.

It is customary to designate any opacity remaining in the pupillary area, after complete or partial removal of the lens, as secondary cataract; hence divers conditions come under this common heading.

In the strictest sense of the word, secondary cataract belongs to those opacities which develop gradually, and only one or two years after complete removal of the lens. The vision, which had been good, sinks to $\frac{1}{12}$, or even to $\frac{1}{36}$, and the printed page is read even with greater difficulty. Under focal illumination a delicate membrane is found to fill the pupillary space, showing generally a number of folds and irregularities of thickness. The disturbance of vision thus produced is much greater than would be supposed on direct examination; it is, however, produced not so much by want of transparency, but much more by irregular refraction. This is best seen on illumination with a plane mirror, especially when a slight rotary motion is imparted to the glass. The inverted image seems to be covered with a veil, and by slightly moving the convex glass the peculiar apparent movements seen in irregular astigmatism are brought out. In corroboration it is found that a marked improvement of vision is always attained by the use of a stenopaic apparatus. The development of this thin membrane is probably owing to the activity of the intra-capsular cells. I have seen it after all methods of extraction, excepting of course when the capsule had been entirely removed. It occurs even when a large piece of the anterior capsule has been removed. This proliferation of the intracapsular cells does not invariably occur. I have watched many cases for many years without observing the slightest trace of secondary cataract. How it will be in this respect as regards peripheral capsulotomy, I cannot say, since the cases as yet are too few to form conclusions.

The best method of getting rid of the disturbance of vision is discission of the membrane with two needles, after Bournan's method, which amounts to simple laceration. I have, however, found it here, as in all needle operations in secondary cataract, to be more practical to use, not the usual thin needle, but a two-edged cutting needle, having a breadth of 2 *mm*, 5 *mm* from the point, the cutting edge itself having a length of about 8 *mm*. In using the ordinary thin needle, it is not infrequent that the membrane spreads out like a spider's web, and when the needles are withdrawn, comes together again. The broad needles offer an advantage in that we may count upon making a wide opening in the membrane.

If the iridectomy has been made upward, it is better to make the incision of the secondary cataract vertical. The operator takes position on the temporal side of the patient, while the light is arranged to fall from the nasal side upon the eye. A bright lamp-flame and lens, or electric light, is preferable to daylight as a rule. The needles are introduced near the upper and the lower borders of the cornea and meet with their points close above the margin of the pupil, and are depressed until their greatest breadth lies within the plane of the membrane. The handles are then approached to each other, and the points effect the necessary laceration in the place best adapted to the optical necessities.

Extraction of the secondary cataract by means of the forceps is also practicable here.

A second form of secondary cataract consists in great part of opaque lens-substance, *e. g.*, as after traumatic cataract, or incomplete removal of the lens in extraction. We need not be in too great a hurry to operate upon such cases; sometimes a few months bring very great improvement. For example:

Mr. B. has had for twenty years irregular opacities of the lens on both sides. The lens is strewn with numerous small striæ which are especially thick towards the margins and the posterior cortex; right, extraction with immediate good result; left, extraction May 13, '84, operation regular, large piece of anterior capsule removed by means of capsule forceps. The lens came out smoothly and apparently entire. June 2d. Left pupil widely dilated, post. synechia at the temporal angle of the sphincter. The pupillary region covered with a large light-colored membrane, which is transparent ophthalmoscopically only at the borders,

$V = \frac{1}{36}$, same as before the operation. The patient was discharged with a prospect of an after-operation, which was, however, not necessary, for by the middle of October, 1884, $V = \frac{1}{2}$ with 12 D in the left eye, and in the pupillary area only a thin transparent membrane was visible.

The opacities which remain in the area of the pupil, after extraction, when the capsule has been opened with the cystotome, or the forceps, consist of the rolled and folded remains of the capsule, portions of lens-matter, and the products of iritis. At the points of adhesion between the margin of the pupil and the secondary cataract, heavy stringy opacities are always seen stretching into the pupillary space. These adhesions of the secondary cataract to the iris give rise to unpleasant difficulties when it comes to a second operation, and it is a material advantage possessed by the method of a peripheral capsulotomy, that these complications are usually absent.

The method of operation to be chosen is materially influenced by the condition of the iris. If there be a sufficiently open pupil, we may elect to split the capsule, or to remove it. In the first of these it is often better to tear the membrane with two needles. The broad double-edged needles before mentioned offer the advantage that the membrane may be actually cut, though usually it is only torn. These delicate tissues, as a rule, cannot be divided even with the keenest-edged knife. The resistance which they offer being so very slight, they hang loosely from the zonula and tear there on the slightest provocation, and the vitreous offers no obstacle to the knife. If we wish really to cut a secondary cataract, then the best instrument is the iridotomy scissors.

For dense secondary cataract, extraction is often the preferable method. The anterior chamber is opened by means of the lance-knife, and we then seek to seize the membrane with the forceps, to do which is not so easy as it seems, since it will often evade the forceps as it does the knife. The forceps, with heretofore described teeth projecting downward, is best adapted to this work. Extraction of secondary cataract has by no means the evil consequences which have been feared for it. A deleterious influence on the ciliary body I have never observed, even in a great number of cases. Injurious traction on the ciliary body seldom occurs, because in actual extraction of the secondary cataract it is not generally torn from its attachment to that body. As a rule, only the portion seized is brought away. Therefore it is advisable to seize the membrane as close to the margin of the pupil as possible, as it may happen that an opening too small and too high up may result.

The more extensive the adhesions are between pupillary margin and membrane, the more necessary it is to consider the iris in our plan of after-operations, wherein we have iridectomy and iridotomy to choose from. In either case we must free the area of the artificial pupil from secondary cataract. In iridotomy it is more effective to divide the secondary cataract at the same time with the iris, and in order to surely do this it is necessary to make an opening in the membrane beforehand with the lance-knife. After having opened the anterior chamber the knife is withdrawn only so far that its point may still remain in the wound, and then after the aqueous has flowed out, its blade may be sunk into the secondary cataract. Through the opening thus made, one blade of the iridotomy scissors is introduced behind the iris, and it is cut through toward the temporal and medial sides. [The author intends that a V-shaped cut shall be made.—Trans.] The wound generally gapes at once, and the tongue of iris left in the middle is drawn towards the periphery. Ordinarily it remains so, but exceptionally the opening is closed by iritis. In such a case we must try what can be done by an iridectomy.

The worst form of secondary cataract is that in which the membrane is composed in greater part of an inflammatory new-formation. Such cases sometimes show three or four weeks after the operation a pretty clear pupil with tolerably good sight, yet there may exist at the time iritis, or irido-choroiditis (with implication of the ciliary body of course). In the course of a few months the pupil is drawn upwards, and the pupillary area closed by a new-formed membrane.

The fact that in many such cases an iridectomy is without result, gave rise to the revival of the older method of iridotomy. An iridectomy and likewise an iridotomy are fruitless, because the posterior surface of the iris is covered with a thick layer of new-formed tissue.

In iridotomy we count on the elastic tension of the iris to produce the necessary gaping. But the new-formed membrane on the posterior surface of the iris, formed probably by a proliferation of the uveal pigment cells, is inelastic, and when cut, the sides remain in apposition like a sheet of paper, and immediately grow together again. This condition may be diagnosticated with certainty when the pupil in a aphakial eye has been closed by an iritis, and the iris is pushed forward in the form of a blunt and ridged cone. The depressions between the knob-like projections indicate that there are denser cord-like masses on the posterior surface of the iris which operate as tractors.

If the iris lies on a level and the anterior chamber has its normal depth, although the presence of a new-formed membrane on its posterior surface cannot be excluded, nevertheless we should try the effect of an iridectomy or an iridotomy. The less the pupillary space is encroached upon by the light-colored pseudo-membrane, and the fewer its adhesions to the margin of the pupil, the less it is narrowed and drawn upward, the more favorable is the outlook for a useful result from an operation.

TWO CASES OF VERTICAL NYSTAGMUS.

By F. E. D'OENCH, M.D.,

ASSISTANT SURGEON TO THE NEW YORK OPHTHALMIC AND AURAL INSTITUTE.

ASIDE from the rare occurrence of cases of vertical nystagmus, the following two possess some points of interest which would seem to make them worthy of being put on record.

Miss Elizabeth L., æt. 21, came to the Dispensary of the New York Ophthalmic and Aural Institute to be examined for glasses, as she had great difficulty in following her vocation of school-teacher on account of her imperfect vision. The sight of her right eye had been poor as long as she could remember, while that of the left was fair, and sufficient for ordinary purposes.

Examination of the right eye showed marked vertical nystagmus, the eye making rapid oscillations about a horizontal axis, with occasionally a brief pause of not more than one or two seconds' duration. The left eye was apparently not affected at all, as no motion could be detected with the naked eye; when, however, it was examined with the ophthalmoscope, this eye also was found to make small vertical oscillations, which scarcely exceeded in amplitude the breadth of the retinal blood-vessels.

As the patient was in a very nervous and excited state, I asked her to come again on the following morning, when she might be examined unaffected by the more or less exciting scenes of the dispensary. The following conditions were then found, besides the nystagmus already mentioned: Both corneæ perfectly clear, nothing abnormal in the iris, lens, and fundus. V in the right eye $\frac{20}{100}$, with $-1D^c - 2D^c$ ax 0° $\frac{20}{50}$; in the left V $= \frac{20}{40}$, which with $-3D^c$ ax 15° could be raised to $\frac{20}{30}+$. The nystagmus was less marked than on the day before, and in the left eye no motion at all could be detected at first, even under the magnifying power of the ophthalmoscope; but after keeping the instrument to the eye for about a minute, slight oscillations began, which lasted only a few seconds, were followed by a pause of about a second, and then began again. When the left eye was covered, and the right forced to fix, the nystagmus ceased; it also ceased when the visual axes converged to a point 5 or 6″ distant, in accordance with the observation frequently made, that strong convergence causes either entire cessation of the oscillations, or at least greatly subdues them.

No cause could be discovered in her history to which the nystagmus might be traced. She is one of seven children, and is the only one thus affected. Both her parents had healthy eyes, and were not consanguineous. The patient has now been under observation more than two years, and no perceptible change has occurred in her condition, except that when she is excited the nystagmus in the left eye increases sufficiently to become visible to the naked eye on close inspection.

Isaac J., æt. 11, was brought to the dispensary on account of convergent strabismus and of nystagmus of the left eye. The mother claimed that the former was the result of great efforts at convergence with which he and other boys had amused themselves four years ago; the latter condition had always existed. The vertical nystagmus of the left eye was very marked, the eye making rapid oscillations about a horizontal axis with only a momentary pause every few seconds. The right eye was apparently not affected at all. When, however, the ophthalmoscope was brought into use, it showed that in this eye also there were slight oscillations about a horizontal axis, which seemed to be synchronous with those of the other eye. V in the left eye $\frac{15}{50}$, with + 1 D^c ax 90° $\frac{15}{30}$; in the right V = $\frac{15}{15}$, the same with + 1 D. When the right eye was closed and he was forced to fix with the left, he declared, before a question had been put to him, that the letters he was looking at "seemed to jump up and down." This, however, did not last long, for when soon afterwards the experiment was repeated, it failed. When the left eye was forced to fix, the nystagmus ceased and was not transferred to the other eye; it also ceased when the eyes converged to a point 4″ distant. Both corneæ were perfectly clear, nor was there any thing abnormal in the lens, vitreous, or fundus. The boy had had measles and croup, but his general health was good. He has two brothers and one sister, whose eyes are healthy ; those of his parents are also normal.

The interesting point in both of these cases is found in the fact that nystagmus of one eye was of such low degree that but for the use of the ophthalmoscope it would have escaped detection. Monocular nystagmus is of very rare occurrence, only a few such cases having been reported, in almost all of which the oscillations took place in a strictly vertical direction. It would therefore not surprise me if in some of these cases the other eye had also been affected, though only to a slight extent and not constantly. In horizontal nystagmus both eyes are always affected, and in the same degree ; at least I have not been able to find any observations to the contrary recorded, if we except statements by Priestley Smith and Dransart, who remark that both eyes are not always affected to the same extent, without however confining the statement to any particular kind of nystagmus.

It is very likely that a centre of co-ordination governing the movements of the eyes exists in each hemisphere, and that both are in such close connection that a disturbance in one produces an exactly corresponding amount of disturbance in the other ; when, however, the eyes are not affected to an equal extent, we must either admit that this connection is not so close as not occasionally to be broken, or assume with Priestley Smith an unequal disturbance of function in the centres of co-ordination governing the combined movements of the eye.

It is also interesting to note the excellent vision which both patients had in the eye which was only slightly affected, although in the case of the young lady there was considerable astigmatism. The usual belief is that congenital poor vision is always associated with nystagmus ; but this I think holds true only of the higher degrees ; lower degrees are not often met with, and are more readily overlooked, especially in the pressure of work entailed by a large dispensary. I cannot believe that the astigmatism had any thing to do with the development of nystagmus in the first case, for if it did, why do we not meet with cases of nystagmus more frequently? Astigmatism is certainly common enough! I would rather refer it to some central cause, the intensity of which was easily increased by even slight excitement; but what this cause was or how it acted cannot readily be explained. A microscopical examination of the nuclei governing the action of the muscles might cast some light on the etiology of these obscure cases of nystagmus, but the chances of securing an autopsy of such a case are naturally very slight; in the meantime all theories in regard to them have but very slight foundations in fact to rest upon.

AN INSTRUMENT FOR TESTING REFRACTION AND ITS ERRORS, THE STRENGTH OF THE RECTI MUSCLES, AND THEIR INSUFFICIENCY.

By WARD A. HOLDEN, A.M., M.D., Cincinnati, Ohio.

THE instrument consists of a thin brass disc 85 *mm* in diameter, rotating on a stand adjustable in height. On each side of the disc is a clip for holding lenses, each allowing 90° rotation of the lens. On one side of the disc in addition to the clip, is a groove in which a lens of oblong shape can be slipped laterally. In the centre of the disc is a perforation 9 *mm* in diameter. A small sliding disc slips before and covers the large perforation. This small secondary disc has at one place a vertical slit and at another place two perforations each 1 *mm* in diameter and 4 *mm* apart.

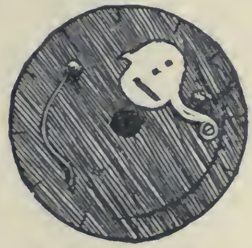


FIG. I.

The disc with its clip for holding lenses, the sliding disc with the slit and two small perforations, and the large perforation open for insufficiency tests.

The lenses used are a cylinder of + 7 D and one of — 7 D, and a prism of 6°. These are similar to the ordinary test lenses, and slip into the clips where they may rotate 90°. In addition, there is a — 10 D cylinder cut into an oblong shape, which slides laterally in the groove on the disc.

The tests for refraction and its errors.

The tests are made by rotating the cylinders of 7 D (the + cylinder in testing hypermetropia and the – cylinder in testing myopia) before the disc with the two small perforations placed horizontally, while the patient looks through them with one eye at a light 6 *m* distant. The cylinders are placed at right angles to each other and two horizontal images are seen. When either cylinder is rotated, one image revolves about the other and the images come into a vertical line. Then when the + cylinder is rotated, one image revolves about the other, and at that point in the rotation where the images become vertical, a pointer on the cylinder indicates on a calculated scale marked on the disc, the amount of hypermetropia in dioptries in the horizontal

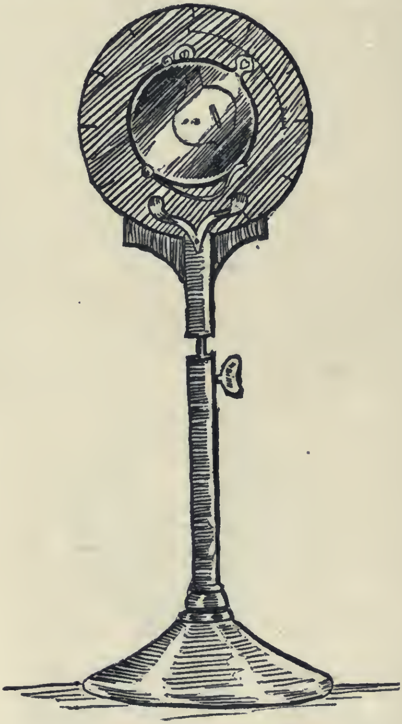


FIG. 2.

The disc on its stand with a cylinder in the clip, and the small perforations in place for refractive tests.

meridian. When the — cylinder is rotated and the images become vertical, the pointer on that cylinder indicates the amount of myopia in the horizontal meridian, on a calculated scale marked on the other side of the disc.

The principle of the tests for refraction.

A cylinder of + 7 D has in its axial diameter a refractive power of 0. In the diameter at right angles to the axial, the refractive power is + 7 D. Then starting from the axial diameter the refractive power constantly increases in successive diameters, from 0 in the axial to + 7 D in the diameter at right angles to the axial. The refractive effect then of a cylinder of + 7 D, rotating through 90° with a stenopaic disc before it, is the effect of a series of + sphericals ranging from 0 D to + 7 D; and similarly the effect of a — cylinder rotating, is the effect of a series of — sphericals. But the revolving cylinder with the slit disc is useless in visual tests with letters, on account of the spherical aberration of the cylinder which blurs the image, and on account of the prismatic effect of the cylinder which displaces the image. The rotating cylinder would be of use, however, in a test which the spherical aberration and prismatic displacement would not affect. In the tests with lights instead of letters, where not the distinctness but the position of images is to be determined, the spherical aberration would not affect the test, and the prismatic displacement could be estimated and even utilized.

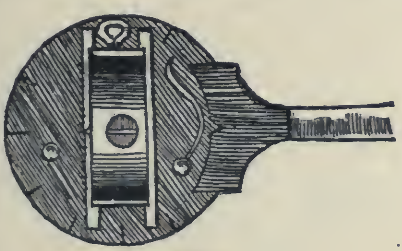


FIG. 3.

The reverse of the disc showing the oblong cylinder in its groove, and the vertical slit in position for muscle strength-tests.

In Scheiner's experiment two pencils of light from a distant object enter the eye through different parts of the cornea. The axes of the pencils come practically parallel, and as they do not pass through the optic centre of the lens, the pencils are deflected, and form on the retina of the emmetropic eye two superimposed images, which appear single. In the hypermetropic eye the deflection of the pencils is not sufficient to bring the two images together, and they form double images. In myopia the pencils cross before reaching the retina, and also form double images.

To illustrate this experiment simply, a card, having two small perforations not further apart than the diameter of the pupil, is held before the eye, and through the perforations a distant light is observed. If the eye is emmetropic in the meridian corresponding to the perforations, the light is seen single. If the eye is hypermetropic, crossed double images result; and if it is myopic, homonymous double images are seen. By slipping a tinted glass before one perforation, it is easily determined whether the images are crossed or homonymous. Then sphericals are placed before the perforations until one is found which renders the image single, and this lens corrects the ametropia in that meridian of the eye. Then, after turning the card, the test may be repeated in successive meridians. The slipping of a number of lenses before the eye is a tedious process however, and often perhaps requires more time than the ordinary tests with the types and test lenses.

If a strong cylinder is slipped before the disc of the instrument, having that diameter whose refractive power corrects the ametropia of the observer in line with the two perforations, we should get a single image were it not for the prismatic effect of the cylinder. If the line of the perforations is horizontal, the correcting diameter of the cylinder brings the two images not together, but *into a vertical line.* The refractive power of the cylinder produces the lateral correction which brings the two images to a vertical line, and the prismatic effect of the cylinder produces the vertical displacement. The refractive power of any diameter of a + cylinder then, is readily determined practically by finding the — spherical which will overcome the lateral displacement of the images which the cylinder causes and bring the two into a vertical line.

If the radius of curvature of the surface in the required diameter is found, and the refractive index of the glass is known, the refractive power may be computed by the formula $\frac{1}{F} : \frac{1}{r} + \frac{1}{r'} :: n - 1 : 1$. F is the focal distance of the lens, r and r' are the radii of curvature of the two surfaces of the lens, and n is the refractive index of the glass of which the lens is made. In a plano-concave cylinder, r', the radius of curvature of the plane surface, is infinity, and $\frac{1}{r'}$ therefore is equal to 0. Then knowing the value of r the radius of curvature and n the refractive index, F the focal distance, the power of the cylinder, is found by $\frac{1}{F} : \frac{1}{r} :: n - 1 : 1$.

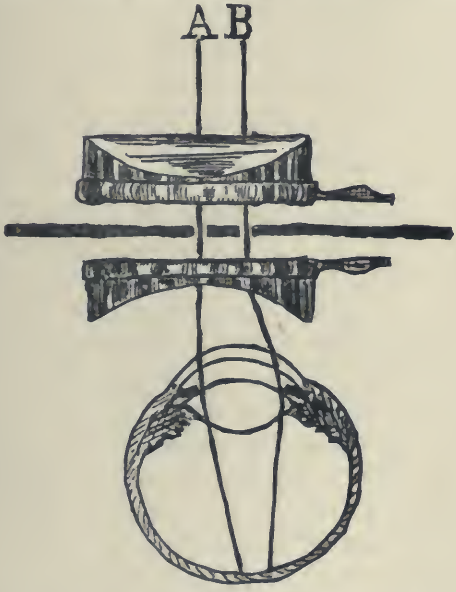


FIG. 4.

The figure shows the + cylinder at o on the scale, not affecting the direction of pencils A and B, while the cylinder is at right angles and deflects pencil B coming through the eccentric perforation of the disc, and the pencils form two images on the retina.

After finding the refractive power of various diameters a scale may be made on the disc, and as the cylinder revolves before the perforations, when the images become vertical, a pointer on the cylinder will indicate on the scale the amount of refractive error.

A + and a — cylinder of 7 D are placed at right angles to each other in the clips, one on each side of the disc. Then no matter what his refractive condition, when the patient looks through the perforations with the axis of the + cylinder at 0 on the scale, he sees two horizontal images, and as the cylinder is rotated they become vertical. If there is hypermetropia, they become vertical before the end of the scale is reached. If there is no hypermetropia, the images become vertical or run together only when the end of the scale is reached. If the latter is the case, the cylinders are again placed at right angles, and the cylinder is rotated in the same manner, and the amount or absence of myopia is determined.

The action and uses of the test for refraction and its errors.

Since hypermetropia is the most frequent refractive error, the patient is first tested for this, and if it is excluded he is tested for myopia. The patient is seated before a high table or shelf on which the instrument is placed, and the stand is adjusted to the height of the eye. One eye is now closed, and the patient looks with the other through the two horizontal perforations, at a small light 6 *m* distant. Two horizontal images of the light are seen, and when the + cylinder is rotated, if the images become vertical before the end of the scale is reached, there is hypermetropia in the horizontal meridian, and its amount is read off the scale. If the images become vertical only when the end of the scale is reached, there is no hypermetropia in the horizontal meridian, and the — cylinder is then rotated, and when the images become vertical, the amount of myopia in the horizontal meridian is read off the scale. If the images here become vertical only when the end of the scale is reached, there is no myopia. We have now determined the refractive condition of the horizontal meridian.

The disc is next rotated 90° making the perforations vertical, and the vertical meridian of the eye is tested. The images appear vertical and when the + cylinder is rotated they become horizontal, and the amount of hypermetropia in the vertical meridian is read off the scale. If the images become horizontal only when the end of the scale is reached, there is no hypermetropia, and the — cylinder is then rotated, and when the images become horizontal, the myopia is read off the scale, or if the end of the scale is reached, there is no myopia. We have now the refractive condition of the horizontal and vertical meridians of the eye.

If the error is of the same amount in both meridians, the case is either one of simple hypermetropia or myopia, or *possibly* a case of astigmatism with the principal meridians at 45° and 135°. If the amount of error is different in the two meridians, there is astigmatism present, and we have the refraction in the 0° and 90° meridians. As a large proportion of astigmatic cases have their principal meridians at 0° and 90°, or a few degrees from these, cylinders of the strength we have found by the instrument are taken from the test case and put at 0° and 90° in a test frame. If now the patient reads $\frac{20}{20}$ by the Snellen types, the astigmatism is at 0° and 90°, and we have determined it. If the patient does not read $\frac{20}{20}$, he probably will, after slight alterations of the axis and strength of the cylinders. If we do not get the correction at once, we proceed to find the meridians of greatest and least curvature, and to test them in the following way.

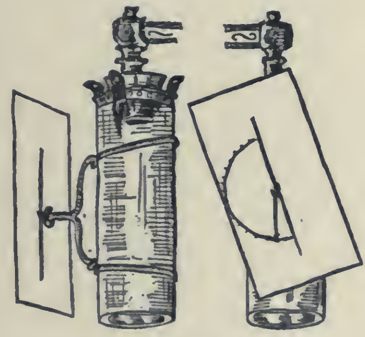


FIG. 5.

In testing astigmatism in oblique angles, a rotating blackened disc 150 *mm* in length and 80 *mm* in width is used. This has a central perforation and a narrow slit, 80 *mm* in length, running longitudinally through the perforation. The wire frame supporting this disc slips over the chimney of the ordinary argand burner used in the tests, and permits the light to come to the patient only through the perforation and the slit. During the previous tests this disc may have been used, the slit being covered, leaving only the perforation, which makes a small and sharp image. The patient is now directed to look at the perforation with the naked eye, and according to the old experiment a ray of light will be seen running from the perforation, at an angle corresponding to one of the principal meridians of his eye. The slit is now uncovered, and the disc is turned so that the slit falls into this angle. The angle may also be found by the test of the radiating lines. A needle on the disc indicates on a scale the angle of the slit in degrees. The disc of the instrument proper is turned to the same angle by a scale on it. The patient looks through the two oblique perforations and sees two oblique images of the small light, each with a line of light through it parallel to the other. As the cylinders are now rotated the images revolve, and the two lines approach each other until both lights appear on a single line, and the refraction in the meridian at this angle is read off the scale on the disc. Then the blackened disc before the light is rotated 90°, and the disc of the instrument is rotated 90°, and a similar test is made, and we have the refraction of the two principal meridians.

The perforations in the disc are made, one central and one eccentric, so the pencil of light coming through the central perforation is never deflected by the cylinders, and the image it forms on the retina remains fixed when the cylinders are rotated, while the image from the pencil coming through the eccentric perforation revolves about the other.

The instrument may be looked through from either side, and in testing hypermetropia the — side is placed next the eye, so that the operator may rotate the + cylinder readily, and when myopia is tested, the instrument is turned the other way.

In speaking of the principle of the instrument and its utility, it may be well to compare it with other instruments for a similar purpose. Prof. Thomson's ametrometer has been considered the best of the optometers based on Scheiner's experiment. He uses the simple disc with two perforations in a frame before the eye, and has an improved arrangement by means of a movable gas jet of finding the distance apart of the double images, and from this distance and the fact that the images are crossed or homonymous, as shown by holding a tinted glass before one perforation, he determines the kind and degree of ametropia. The involuntary acts of accommodation however impair the test, and the ciliary muscle must be paralyzed.

There are two methods of measuring ametropia by Scheiner's experiment, first, by finding the distance apart of the images, and second, by finding the lens which will bring the two images together. The first method has been made more accurate by Prof. Thomson's improvement without changing the principle of the test. Instruments utilizing the second method have all used a series of sphericals, as was originally done. The instrument here presented is the first, based on Scheiner's experiment, that has simplified the determination of refraction by means of the correcting lens.

The Culbertson prisoptometer, it is claimed, will test latent hypermetropia without paralysis of the ciliary muscle. This instrument consists of a double prism, *i. e.*, two prisms placed bases together in a stand through which a distant circular disc 220 *mm* in diameter is looked at. Two images of the disc are seen. In emmetropia the two images are tangent to each other, in hypermetropia the images overlap, and in myopia they are apart. Lenses from a trial case are slipped into the clips of the instrument until one is found which renders the two images tangent, and this is the lens required to correct the ametropia.

If a light were looked at through the prisoptometer, the two images would be near together or superimposed in hypermetropia, and homonymously double in emmetropia and myopia. The double prism lets two pencils of light fall on different parts of the cornea, and is really Scheiner's experiment with prisms before the perforations which converge the parallel pencils before they enter the eye. It is, then, an improvement when the object disc is used, as hypermetropia and myopia may be distinguished without the use of tinted glasses to find whether the images are crossed or homonymous. But there is no necessity for the double prism. A strong + cylinder or even a + spherical before two perforations in a disc has, of course, the same effect. And to perform the test simply, a + spherical of a strength corresponding to the diameter and distance of the object disc, may be slipped into the stationary clip of a trial frame, and a match or any other narrow body placed in the rotating clip so as to pass before the centre of the pupil of the eye. Two images will be seen, and lenses from the test case may be held before the frame until one is found which renders the two images tangent. Then, if the match is rotated, the refraction of other meridians may be tested in the same way, and the angles read off the scale on the test frame.

The prisoptometer, it is claimed, will bring out latent hypermetropia, if a spherical of + 7 D is placed in the clip, and — sphericals are slipped before it until the correction is made by the combination. For example, when there is a latent hypermetropia of + 1 D, if the simple instrument is taken, a lens of + 1 D will not make the correction, but if a + 7 D lens be first placed in the instrument and then a lens of — 6 D be slipped before it, this combination, which is equal to + 1 D, will make the correction. What possible difference there could be in the result, whether the + 1 D was obtained by a spherical of + 1 D, or by a combination of sphericals of + 7 D and — 6 D, or by two sphericals of + .5 D, or any other combination, is difficult to understand. The effect of the + 7 D spherical is to increase the convergence of the pencils, and this would be more easily accomplished by making the prism a few degrees stronger. Then the lens which renders the two images tangent could be subtracted from + 7 D, and the result would be the amount of hypermetropia. But this will not bring out latent hypermetropia.

There has been much confusion from confounding *facultative* and *latent* hypermetropia. In facultative hypermetropia the patient reads $\frac{20}{20}$ with the naked eye, and also reads $\frac{20}{20}$ with a + lens. For example, before a mydriatic is used, a patient reads $\frac{20}{20}$ with the naked eye, and also reads $\frac{20}{20}$ with a lens of + 1 D. Under mydriasis his vision is only $\frac{20}{40}$, and becomes $\frac{20}{20}$ by using a lens of + 1 D. But after mydriasis has passed off, he still accepts the + 1 D and reads $\frac{20}{20}$ with it, while he again reads $\frac{20}{20}$ with the naked eye. This is the history of a large proportion of hypermetropic cases, but it is facultative hypermetropia only. Had there been any latent hypermetropia, a stronger lens than + 1 D would have been accepted under mydriasis.

With the ophthalmoscope, a facultative hypermetropia may be generally made out without mydriasis. This facultative hypermetropia is generally made out by the instrument under consideration, and probably by any optometer based on Scheiner's experiment. But truly latent hypermetropia is probably not made out by the ophthalmoscope before mydriasis, nor by any instrument based on Scheiner's experiment, although, if the prisoptometer will show it, of course any instrument based on Scheiner's experiment will. Dr. Culbertson has prepared a lengthy table of cases of hypermetropia, which he tested under mydriasis by the types and test lenses some years ago, and which he has lately tested by his prisoptometer without mydriasis, and he finds in most cases the same results. From this he concludes that the prisoptometer will test latent hypermetropia. The cases were mostly slight degrees of hypermetropia, where we should expect only a facultative hypermetropia, and what makes it seem more probable that nearly every case was simply a case of facultative hypermetropia, is that in two cases where he had found the hypermetropia considerable under mydriasis, the prisoptometer did not show the total amount. These cases had beyond a doubt some latent hypermetropia, which the prisoptometer could not show. Dr. Culbertson, however, explains them by supposing that in these cases the hypermetropia had decreased some few dioptries since he first tested them a year or two before. If he is correct in his explanation, these cases of a *retrogressive* hypermetropia are of considerable interest, and should be looked into further.

When we try to measure the distance between the horizontal images in Scheiner's experiment, unless the ciliary muscle is paralyzed, the involuntary acts of accommodation change the relative positions of the images and render the test inaccurate in many cases, but in the instrument under consideration, where the distance of images apart is not determined, and images are not brought together but into a vertical line, acts of accommodation rarely disturb the test. If they should, it is easily detected by rotating the cylinder two or three times and seeing whether the results are the same. The instrument then acts well as a phakometer, by holding the lens to be tested before it, and making the test for the strength of a + lens by rotating the — cylinder, and *vice versa;* and by turning the lens, any diameter may be tried, and so even crossed cylinders may readily be tested.

The refraction in the 0° and 90° meridians is determined with a simple light without the blackened disc before it, and in the great majority of cases this is all we care to know, to put on the correcting lenses. Practically, then, the instrument is complete in itself, requiring no slipping on of test-case lenses. It is simple in construction, works with a maximum rapidity, and requires a minimum amount of intelligence on the part of the patient.

The test for finding the prism—overcoming strength of the recti muscles.

The cylinders used for refractive tests are taken out of the clips, the small disc is slipped so that the vertical slit is in the centre of the instrument, and a cylinder of — 10 D cut in a quadrilateral form 12 *mm* wide in the line of its axis and 36 *mm* long, is placed in a groove in which it slides laterally before the vertical slit. The axis is placed in line with the slit, and a distant light is observed with one eye looking through the slit and the other outside of the instrument. A single image of the light is seen, and as the lens is slowly slipped outward, at some point double images appear, which run some distance apart and cannot be fused again. Then on a scale on the instrument is indicated in degrees the strength of prism which the external muscles will overcome. The lens is then slipped inward, and in the same manner the strength of the internal muscles is read off the scale when double images appear. The whole disc may be rotated 90°, and in a similar way the superior and inferior muscles tested.

The principle of the test for finding the strength of the recti muscles.

The deflecting power of a prism depends on the angle between its surfaces, and this power increases as the angle increases. The prismatic effect of any point on a plano-cylindrical lens, is the effect of a prism one of whose surfaces is tangent to the cylindrical surface of the lens at that point, and the other, the plane surface of the lens. Starting then in the center of the cylinder, and going in the diameter at right angles to the axis, every point has a peculiar prismatic power, increasing as we reach the periphery. Thus a cylinder slipped past a slit parallel to its axis, has the effect of a series of increasing prisms. A cylindrical lens of 10 D, 36 *mm* in diameter, has at its periphery a prismatic power of 20°. A weaker cylinder would have to be greater in diameter to have 20° of prismatic effect, but it is immaterial whether a + or a — cylinder is used.

When the cylinder is pushed to the end of the scale and the images are still single, the muscles are able to overcome more than a 20° prism. If the internal recti are able to overcome 20°, they are sufficiently strong and it is practically never necessary to test them further.

If we ever care to go beyond this, a supplementary strong prism from the trial case is placed in the other clip, or before the other eye, and its degree added to the degree indicated on the scale.

The action and uses of the test for finding the strength of the recti muscles.

The lens is placed with its axis over the slit, and has then no prismatic effect. When it is slipped in either direction, it acts as a series of increasing prisms. When a horizontal prism is held before one eye and the other left open, two horizontal images are seen at first, which may run together if the prism is not too strong for the muscles. With this instrument, when the lens is slowly moved the eyes continually adjust themselves to the increasing prism, and the image remains single until the strongest prism is reached that the muscles can overcome, and when the lens is moved beyond this, the images fly apart and cannot be fused again.

It takes some little time to place a series of test-case prisms before an eye, and the repeated efforts to fuse the images cause fatigue, but this instrument tests the strength of the internal and external, and even the superior and inferior recti, quickly and accurately with little effort on the part of the patient.

The test for insufficiency of the recti muscles.

The small disc is slipped aside leaving the large perforation in the centre of the instrument, and a 6° prism is placed base upward in one of the clips.

The patient looking with one eye through the perforation, and with the other outside of the instrument at a distant light, sees two images. If the images are exactly vertical, there is no insufficiency. If the images are oblique, the prism is rotated base inward until the images come into a vertical line, and then the degree of insufficiency is read off a scale on the disc. The ordinary line with a central dot is used in a similar test for insufficiency for near objects. Then the disc is rotated 90°, and the images will appear horizontal if the superior and inferior recti are balanced. If the images are oblique, the prism is rotated until the images become horizontal, and the degree of insufficiency of the superior or inferior recti is read off the scale.

If the images are fused, when the prism is placed horizontal, a supplementary strong prism is slipped into the other clip, and the scale is not altered.

In testing the internal recti, if the images show any tendency toward oscillation, a supplementary prism may be placed vertical in the other clip, and the images will be seen further apart and oscillation will not occur.

The principle of the test for insufficiency of the recti.

A prism placed base downward before an eye produces an upward vertical displacement of the observed image. And if the prism is rotated from its position with base inferior, to a position with base internal, the images describes a 90° arc of a circle, whose centre is the true position of the image. A prism placed oblique then has the effect of a prism placed vertical, combined with a prism placed horizontal.

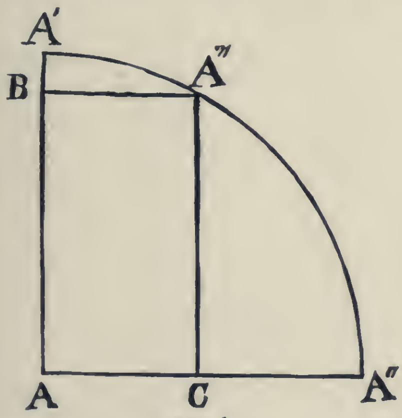
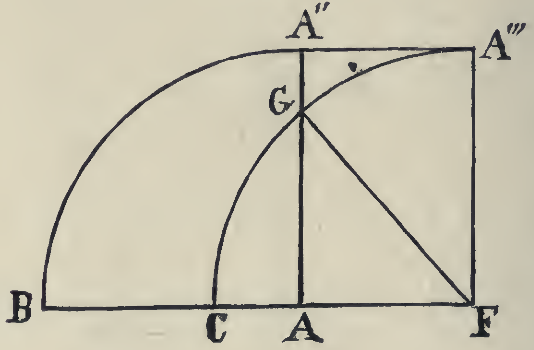


FIG. 6.

For example take a prism which will displace the image A to A′, when placed vertical, and which will displace image A to A″, when placed horizontal. Then if the prism is rotated, the displaced image will describe the arc A′A‴A″. If the prism is rotated 30° from the vertical, the image will appear at A‴. Now let a horizontal prism be taken that will displace A to C, which distance AC is equal to BA‴, the sine of 30°, and let another prism be held vertical that will displace A to B, which distance is equal to A‴C, the cosine of 30°, and the resultant effect of this combination of prisms will be the displacement of A to A‴. Thus the displacing effect of an oblique prism is equal to the resultant effect of a horizontal and a vertical prism.

Taking then a given prism in an oblique direction, we can, from the position of the displaced image, compute the vertical and lateral displacement, and we can determine the strength of horizontal and vertical prisms necessary to produce the displacement.

In tests for insufficiency of the internal recti, the strength of the vertical prism is immaterial, the amount of lateral displacement alone interesting us. If a strong prism is placed vertical before one eye of a person having insufficiency, the image will be obliquely displaced, and when the prism is rotated base inward the image will describe an arc, which intersects the vertical line from the true image seen with the other eye.



Let A be the true image, then if a prism be placed vertical before an eye the image A is displaced to A″, and if the prism is rotated the false image describes the arc A″B whose centre is A. Now if there is an insufficiency of the internal recti, the image is displaced to A‴, the prism producing the vertical displacement AA″ and the insufficiency producing the lateral displacement A″A‴. Let the prism be rotated, and the false image describes the arc A‴GC whose centre is F which is distant horizontally from A, the distance A″A‴. Now if the prism is rotated until its axis is in the line FG, the false image moves from A''' to G, and the false image at G, and the true image seen with the other eye at A, are in a vertical line.

The oblique prism here has the effect of a combined vertical and a horizontal prism. The vertical prism is the one that would displace A to G, and the horizontal prism is the one that would displace F to A, *i. e.*, the one that would correct the insufficiency.

The horizontal displacing power of a prism at any angle may be determined by estimating the strength of a prism necessary to produce a displacement equal to the sine of the angle. The horizontal displacing power is readily found arbitrarily, by placing horizontal prisms with bases the other way until one is found which corrects the horizontal displacement and brings the two images into a vertical line. The horizontal prismatic effect of the given prism at a number of angles is found, and a scale is made on the disc. Then as the prism is rotated, at the point where the two images become vertical, the degree of insufficiency is indicated on the scale by a pointer on the prism.

The action and uses of the test for insufficiency of the recti muscles.

The usual test, by placing a vertical prism before the eye, and then slipping successive horizontal prisms before that, is often very tedious, and as the different prisms are used the eyes become fatigued, the false image oscillates, and an accurate test is impossible. By the instrument, the internal recti, and also the superior and inferior recti, are tested readily and accurately.

The tests for insufficiency might also be made by using the two cylinders in slides at right angles to each other, one producing vertical displacement of the image, and the other sliding laterally, acting as a series of horizontal prisms. But by using the rotating prism, the test is perhaps simpler, although the tests for refraction, for muscle strength, and for insufficiency might all be made with one + and one — cylinder.

NOTE.—After this manuscript had been finished and passed into other hands, a friend who read it referred me to a paper by Dr. R. Berlin, in *Klinische Monatsblätter für Augenheilkunde* for 1871, page 34, which in my ignorance of the German literature had been overlooked. In this paper Dr. Berlin shows how a rotating prism might be used for insufficiency tests.

His method was never practically useful. The present instrument it seems proper to present, since by modifications of the idea which Dr. Berlin first advanced, a theoretical principle has been made a practical test.

His method is briefly as follows: A 16° prism was rotated in a frame which was held before the eye. When this prism was rotated 3.3° from the vertical, it had the horizontal displacing power of a 1° prism. When rotated 45° it had the horizontal effect of a prism of about 12°, and of a vertical prism of 12°. When rotated so that the vertical effect was less than that of a ten or twelve degree prism, he found that in many cases an oscillation occurred, and an accurate test was impossible. To avoid this difficulty, he was obliged to use a prism as strong as 16°. But the stronger the prism used, the less the rotation required to produce a degree of horizontal effect, and the less the rotation, the less accurate was the test. And since a rotation of 3° on a small scale made a difference of 1° in the horizontal prismatic effect, and since most cases of insufficiency are of three or four degrees only, it is easy to understand why his method was of no practical value.

The two essential conditions, then, for a practical test with the rotating prism are, first, a wide vertical separation of the two images at all times during the rotation, and second, a scale which shall have a considerable number of degrees to each degree of horizontal effect. While working out the present instrument independently, it was seen that a weak prism did not give the first essential, and that a strong one failed of the second. It occurred then to add a stationary prism of 10°, with axis vertical.

Thus the first condition was fulfilled, as when the rotating prism was turned even to the horizontal, the images were still separated the distance produced by a 10° prism. A prism of 6° was then rotated, and when at 90° from the vertical, it had the effect of 6° of horizontal prism. Thus it took 15° rotation of this prism to give 1° of horizontal effect, making the scale nearly five times larger than the scale of Dr. Berlin, and fulfilling the second condition. And if it were ever necessary to test an insufficiency of more than 6°, an additional prism could be placed before the other eye, and its degree added to the degree indicated on the scale.

Tab. III.

Fig. 1.

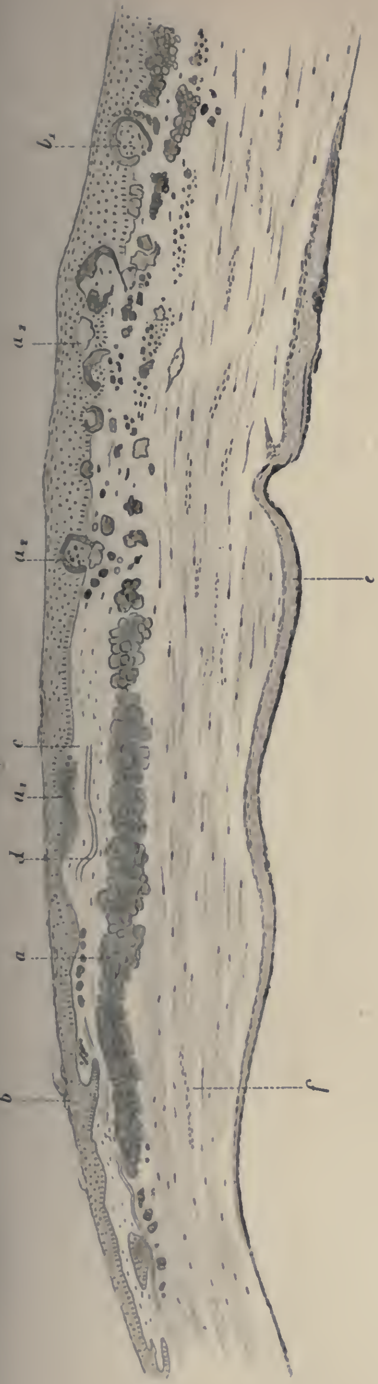


Fig. 2.

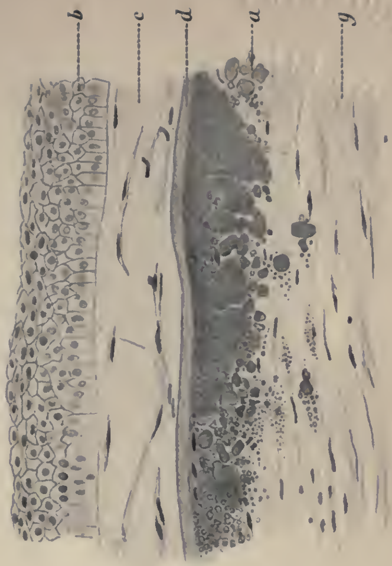
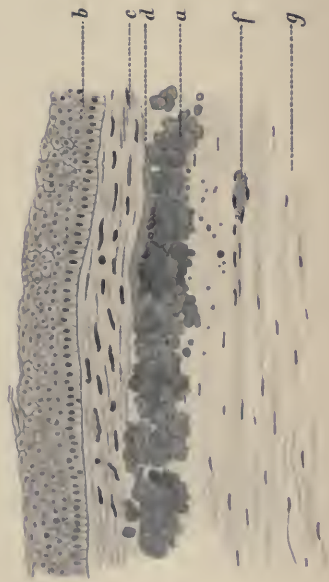


Fig. 3.



Lith Anst v C Kirst, Leipzig

Verlag v J.F Bergmann, Wiesba

Fig. 4.

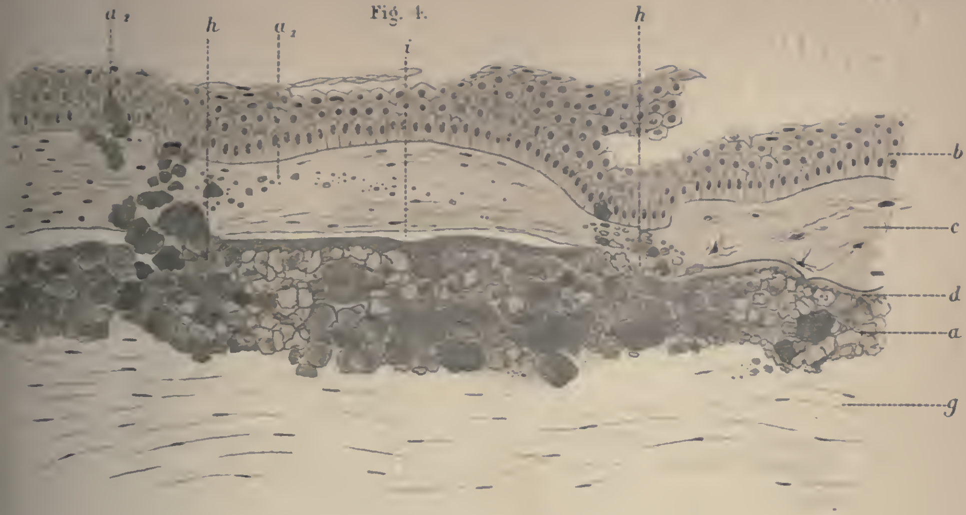


Fig. 5.

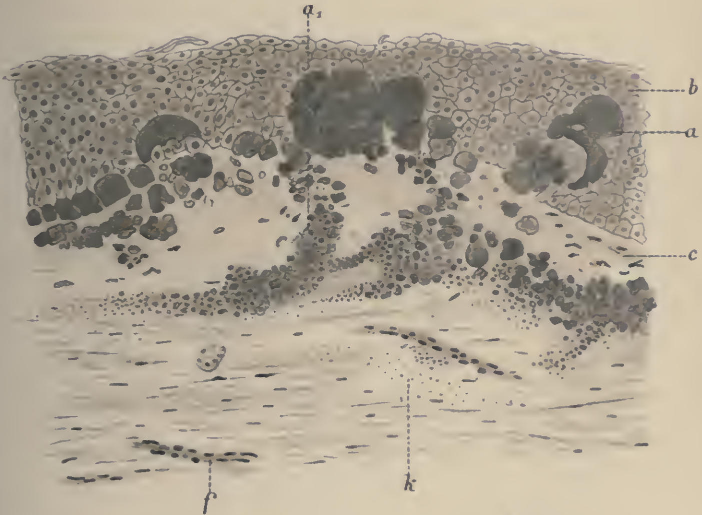
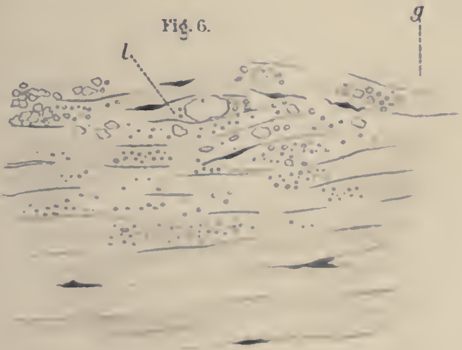


Fig. 6.



Anst. v. C. Kirst, Leipzig

Verlag v. J. F. Bergmann, Wiesbaden

AMYLOID IN THE CORNEA OF A STAPHYLOMATOUS EYE.

By Dr. O. BESELIN,

ASSISTANT SURGEON TO THE UNIVERSITY OPHTHALMIC HOSPITAL, IN BERLIN.

Abridged and translated by H. Knapp.

(*With plates iii. and iv.*)

BEFORE the enucleation of the eye, a yellow discoloration was noticed in the centre of the cornea. The microsopic examination showed it to be caused by what has been called colloid of the cornea, yet with this difference, that the iodine reaction demonstrated it to be amyloid. The occurrence of amyloid in the cornea has once only, by Frisch, been recorded. The degeneration in our case was limited to the cornea.

The eyeball had been removed (by Prof. O. Becker, in Heidelberg, who kindly gave it me for examination), from a man, 21 years of age, who, in his sixth year, had suffered from phlyctenular ophthalmia, immediately followed by enlargement of the globe.

The freshly enucleated eyeball measured 37 *mm* in its antero-posterior diameter, by 27 *mm* in the equator. The enlargement was chiefly due to the so-called intercalary portion of the sclera. The alterations of the membranes were those usual in high degrees of corneo-scleral staphyloma.

Microscopically, the superficial layers of the cornea proper, a new-formed subepithelial stratum, and here and there also the corneal epithelium, are infiltrated by *peculiar, homogeneous, highly refractive, organic masses.* Bowman's membrane is defective, only small portions of it being found here and there (*d* fig. 1, 2, 3, 4, on plates iii. and iv.) A new-formed connective tissue layer, as wide as the epithelial layer, separates the epithelium from Bowman's membrane. Its ground substance is pervaded by a network of fine, anastomosing tubes, the walls of which contain elongated nuclei. The fine tubes, consequently, were capillary blood-vessels (fig. 2, *c*, plate iii.). In other places the ground substance contains spindle-shaped or stellate cells, with communicating offsets (fig. 4, *c*, pl. iv.). The ground substance may assume also a fibrous structure, with a striation parallel to the surface of the cornea, and freely interspersed with fusiform cells (fig. 3, *c*, pl. iii.). Where Bowman's membrane is preserved, it separates this layer, in general, from the corneal tissue, and the long lines of the hyaline deposit; in some places, however (fig. 1, *d*, pl. iii.), it undulates through the middle of the fibrous layer.

The subepithelial cicatricial layer, at some points, broadens (fig. 1, pl. iii. on the right, and fig. 5, pl. iv.), and gradually merges into the regular arrangement of the corneal lamellæ. It contains but few cells, but a great many tightly filled blood-vessels. The extraneous deposits vary in size and shape. The smaller appear as mere round dots, strewed into the substance like granules of inorganic substance, for instance chalk (fig. 6, pl. iv.); the middle-sized are round or oval, like fat globules (fig. 5, pl. iv.); the larger form irregular lumps, some of which are fissured or broken (fig. 4, pl. iv.).

These *homogeneous formations showed the typical amyloid reaction by iodine solution and iodine violet*, whereas by gentian violet and methyl violet, the reaction was indistinct. Iodine produced in a few minutes a dark mahogany color. Addition of concentrated or diluted sulphuric acid, according to Virchow and Böttcher's method, rendered them darker, but produced no changing of color. Other reagents brought out no characteristic alterations.

Concerning the origin of amyloid in the tissue, pictures like figure 6 on plate iv. in our case seem to be conclusive. The high magnifying power (Zeiss' oil immersion) rendered the single corneal lamellæ distinctly visible, so that the smallest amyloid formations, from mere, scarcely perceptible dots up to larger globules, were seen in them, not between them. The accumulation of larger masses near the surface, and of smaller ones in the deeper layers of the cornea (fig. 6, also fig. 5, on pl. iv.), seems to indicate that the morbid process originated in the outer layers and progressed toward the inner. In the case under consideration, it was not possible to detect a relation of the amyloid deposits to cells, as has been described by Leber, Hippel, Mandelstamm, and Bozowitsch (*Graefe's Archiv*, vol. xxv.). These authors, having found amyloid lumps surrounded by an envelope, which contained one or two nuclei, pronounce the amyloid to be a product of these cells. The walls of the new-formed blood-vessels in the cornea were free from amyloid degeneration. Raehlmann[1] observed in the conjunctiva, besides true amyloid, masses of like external aspect, but staining only yellow by iodine. He therefore considers them as a hyaline preliminary stage of amyloid. Our specimen showed no such distinction, all the deposits, even the smallest granules, stained uniformly dark brown.

Frisch[2] states that amyloid, in rare cases, occurs in my cotic keratitis of the rabbit. Lumps yielding the characteristic reaction, were enclosed in the fixed corneal corpuscles, probably as a product of the protoplasm, a condition totally different from that in the case under consideration.

Colloid and chalky deposits, similar in appearance to amyloid, have been noticed in various affections of the cornea, and described by many authors,—Goldzieher, Saemisch, Wedland Bock, von Graefe, Bowman, Nettleship, Alt, and others.

Our case shows amyloid degeneration of the cornea as a local affection ; the same as is met with in the conjunctiva. It did not originate in the cells, but showed a degeneration of the fibres, not as a diffuse alteration of their contents (amyloid imbibition of connective tissue, resembling sclerosis, Eberth), but rather as an impregnation of the tissue with amyloid substance (as according to Virchow's comparison, lime salts are deposited), or as a gradual conversion of preëxisting tissue constituents.

---

[1] See his valuable paper on Amyloid Degeneration of the Conjunctiva, in vol. xi., 171, of these ARCHIVES.

[2] Peculiar Products with Amyloid Reaction in Mycotic Keratitis. Transact. Vienna Acad. of Sciences, vol. lxxvi., session of July 19, 1877.

EXPLANATION OF THE FIGURES ON PLATES III. AND IV.

Fig. 1.—Survey picture. Alum-carmine staining. Magnified 52 x. Amyloid deposits in cornea.

a. Amyloid in corneal lamellæ.

*a*1. Amyloid in subepithelial new-formed connective-tissue layer.

*a*2. Amyloid in epithelial layer.

b. Epithelium.

*b*1. Concentric epithelial globules.

c. New-formed connective tissue.

d. Bowman's membrane.

e. Iris.

f. New-formed vessels in cornea.

g. Corneal lamellæ.

Fig. 2.—250 x. Amyloid in corneal lamellæ, separated from Bowman's membrane by subepithelial, new-formed connective tissue, pervaded by capillaries. Lettering as above.

Fig. 3.—185 x. Amyloid in corneal lamellæ. A piece of Bowman's membrane preserved. Subepithelial layer fibrous and cellular.

Fig. 4.—320 x. Penetration of amyloid through Bowman's membrane into subepithelial tissue and partially also into epithelium.

h,h. Places of perforation.

i. Artificial fissure.

Fig. 5.—195 x. Amyloid, accumulated chiefly in the homogeneous subepithelial layer, infiltrating in finely divided particles into the corneal lamellæ below, and penetrating as heavier masses into the epithelium above.

Fig. 6.—700 x. (Zeiss, oil immersion $\frac{1}{12}$, eye-piece 3) corresponds to the place *k* in Fig. 5. Fine division of amyloid granules in corneal lamellæ; toward the epithelium the size and number of the amyloid granules increase. At *l* a corneal lamella broadened by a larger amyloid globule.

ON CO-EXCITATION IN THE REGIONS OF HOMONYMOUS VISUAL FIELDS.

By Dr. A. SCHIELE,

ASSISTANT SURGEON TO THE OPHTHALMIC CLINIC AT BERNE.

Abridged and translated by H. Knapp.

(*With six lithographic plates, v.–x.*)

A CASE of hysteria masculina, which Prof. Lichtheim requested me to examine perimetrically, drew my attention to the results of retinal fatigue. In the literature a paper by Förster, "On the Measurement of the Visual Field" [V F],[1] and another by Wilbrand[1] on Neurasthenic Asthenopia,[2] have been of particular value to me.

The patient of Prof. Lichtheim was a man of twenty-five years, weakly and hypochondriac, with hereditary neurotic tendency. He suffered from headache, dizziness, drowsiness, spasms in his stomach and legs, pain in his back, convulsive attacks, etc. He is readily hypnotized, paræsthetic, but not cataleptic. M 5–6 D. Ophthalmoscopic condition, color and light sense normal. The first examination showed an almost normal V F in his right (fig. 1, pl. v.), and a concentric contraction to about 5° in his left eye (fig. 2). The next day, after he had read and written for an hour, V F was contracted to 10° R (right eye) and 4° L. The fatigue sustained by the examination, which lasted half an hour, reduced V F to 5° R and 2° L. Then I examined him with spectacles for one quarter of an hour, which reduced V F to 3° R and to the point of fixation L.

In two days, during which patient had worn smoked protectors and not used his eyes to any work, V F was 5°–10° R, and 5° L. During the next days V F is 3°–5° R, and reduced to the point of fixation L. In spite of this high degree of contraction of his V F, his "orientation" is in no way impeded, and he moves about as freely as if his V F were normal. Similar observations have been made by Wilbrand, Thomsen, and Oppenheim.

---

[1] Transact. of the Tenth Ophthal. Congress of Heidelberg, 1877, p. 162.

[2] These Arch., vol. xii., p. 428.

In my further investigations I tried to determine the influence of fatigue of one eye on the other, of one half or one part of one retina on the remainder of the same and on the other eye, since the fact that the eye examined after the other always showed a greater contraction of V F, suggested the supposition that the *fatigue did not tell on the retina, but on the occipital lobes.*

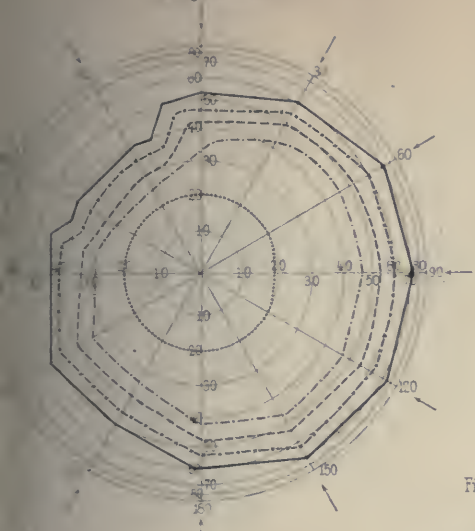
Case 2.—Mrs. F., forty-seven years, anæmic, weak, hypochondriac, suffering from neurasthenia. S R $\frac{1}{10}$, L $\frac{1}{2}$, odd atrophic. The V F F varied considerably on different days. In the left eye examined five times in succession during forty-five minutes, the V F became narrower each time, as is represented in fig. 4, till it was reduced to a circle of 5° radius (fig. 3), in which, as in the former fields, all the colors were distinguished.

Twelve days later its meridians were examined in regular succession, according to Wilbrand, eight times within twenty minutes. Each examination took 2.5 minutes, which is possible with Scherk's perimeter only, and reduced the V F by about 2°, as is represented in fig. 6, plate vi.

The results of these examinations teach two things: (1) the V F of the fatigued eye contracts regularly in each further examination by an equal quota (2°), *i. e.*, in arithmetical, not geometrical progression. (2) The other eye fatigues in the same manner as the one directly affected. This latter fact is indubitable proof that the fatigue does not take place in the retina, but in the occipital lobes. In the cortex of the latter the fatigue of the crossed fascicle is transmitted, quasi by irradiation, to the lateral fascicle, and *vice versa.*

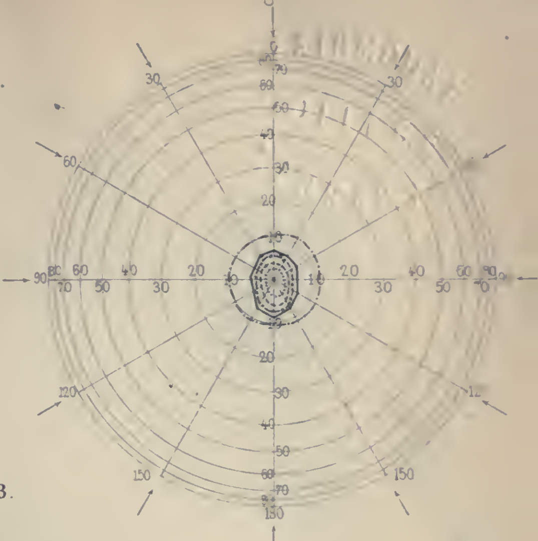
I now fatigued only one, the nasal, half of each eye (figs. 7 and 8), and in the left made eight successive examinations. Each showed a contraction of about 2½° over the preceding one, as seen in fig. 8. Immediately after the last experiment of fatigue in the

Fig 1.



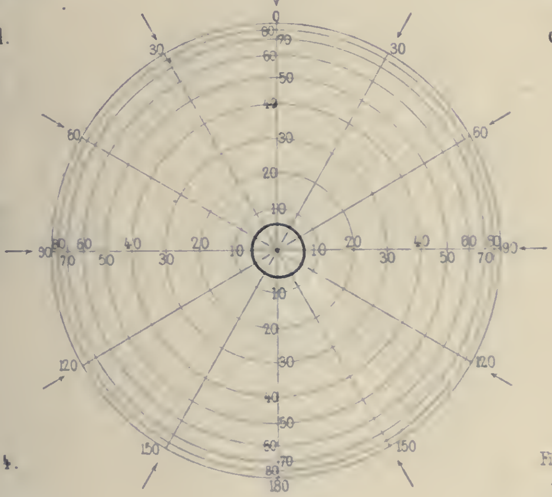
o.d.

Fig 2.



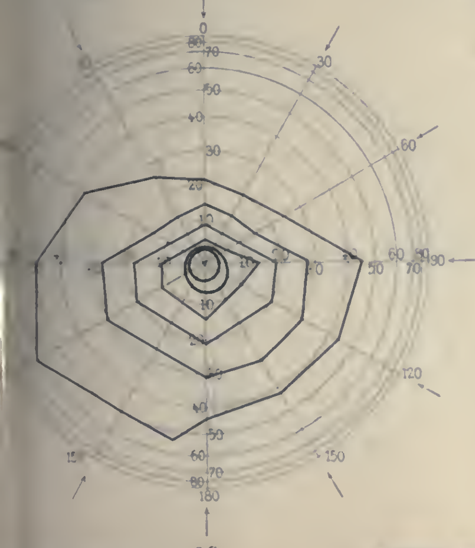
o.s.

Fig. 3.



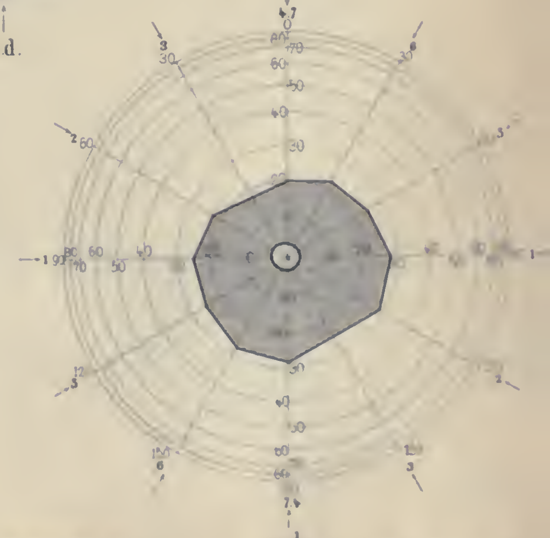
o.d.

Fig. 4.



o.s.

Fig. 5.

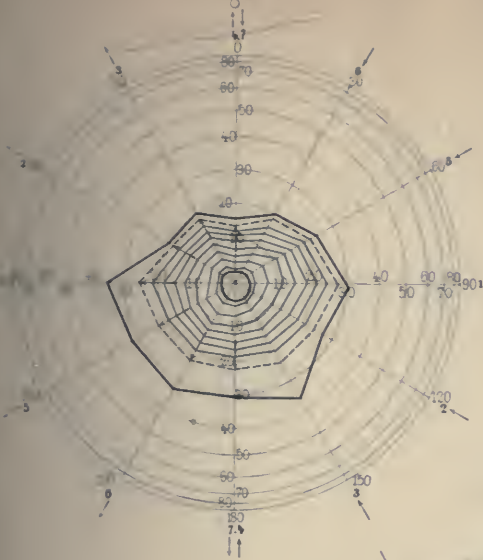


o.d.

F. Wirtz Darmstadt

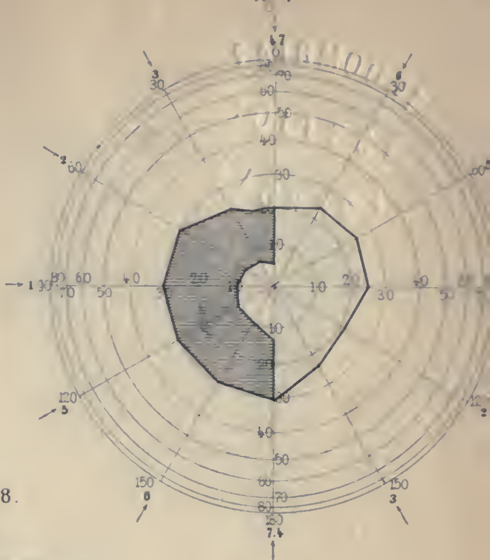
Verlag v. J.F. Bergmann, Wiesbaden

Fig 6



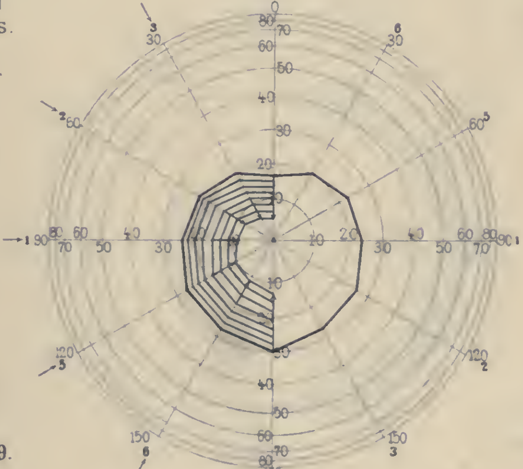
o.s.

Fig 7



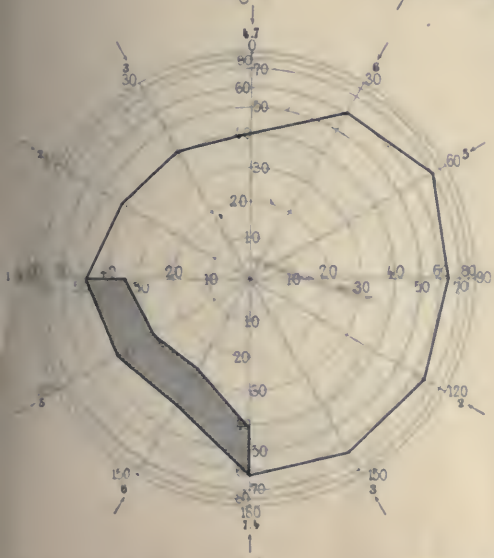
o.d.

Fig. 8.



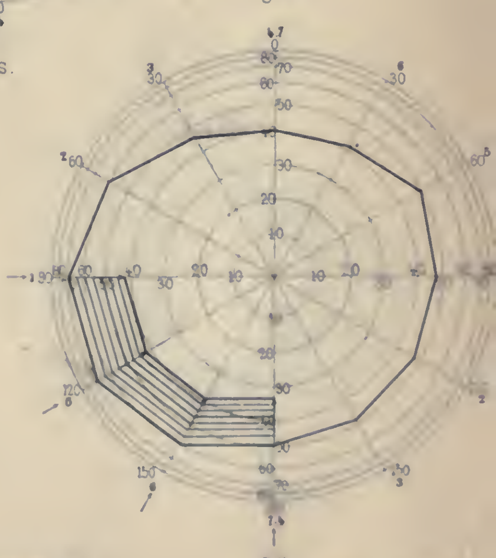
O S.

Fig. 9.



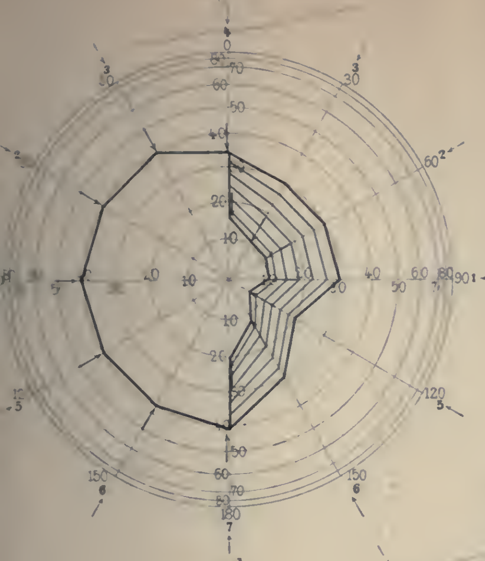
o.d

Fig. 10.



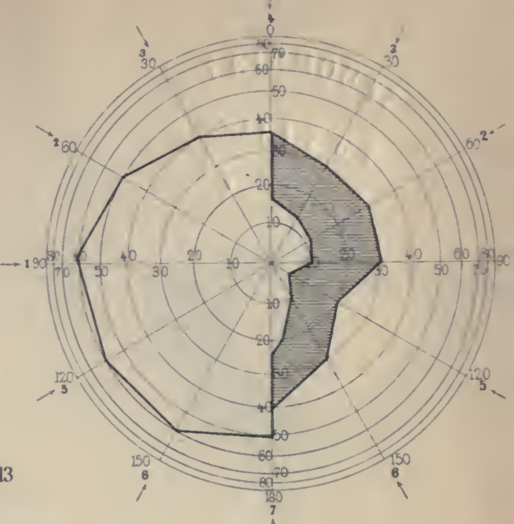
O.S.

Fig. 11



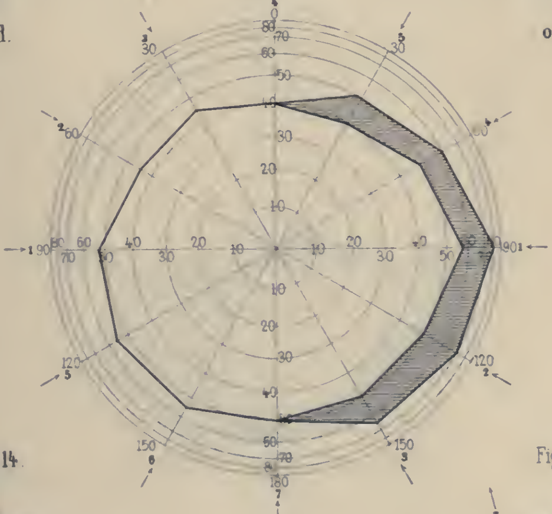
o.d.

Fig. 12



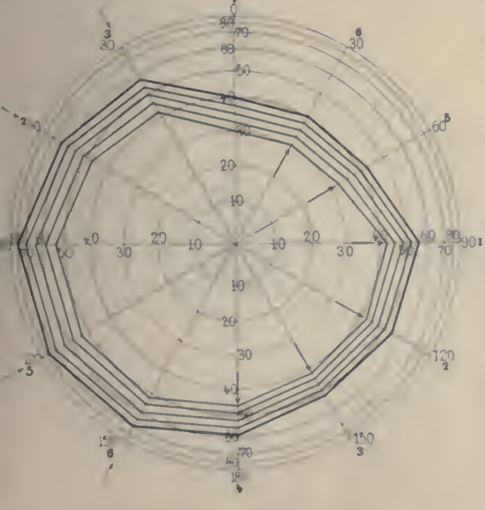
o.s.

Fig. 13



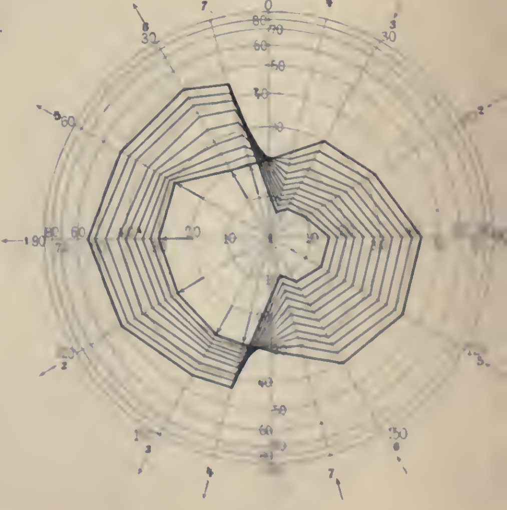
o.d.

Fig. 14.



o.s.

Fig. 15.

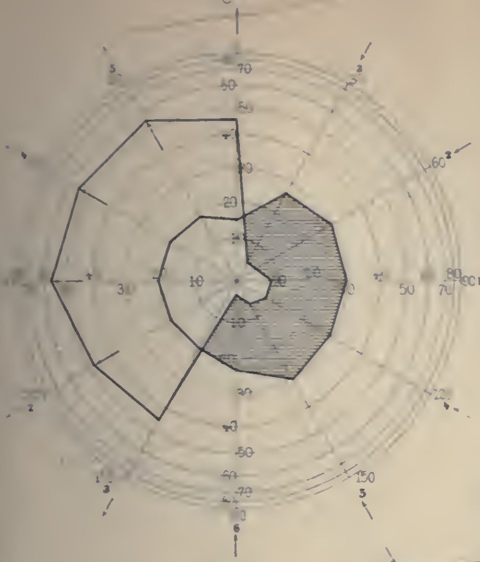


o.d.

Lith. Anst. v. F. Wirtz, Darmstadt

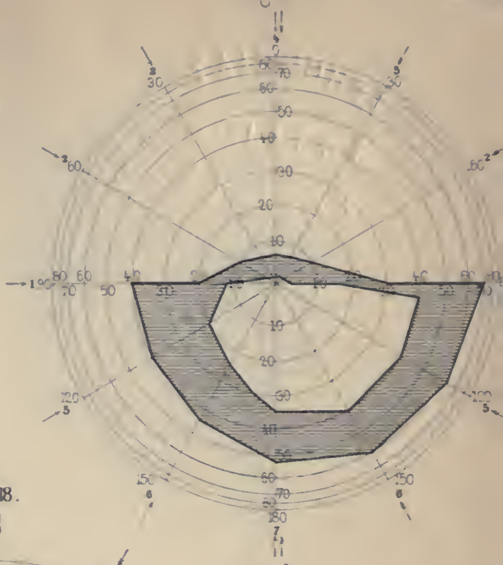
Verlag v. J. F. Bergmann

Fig. 16



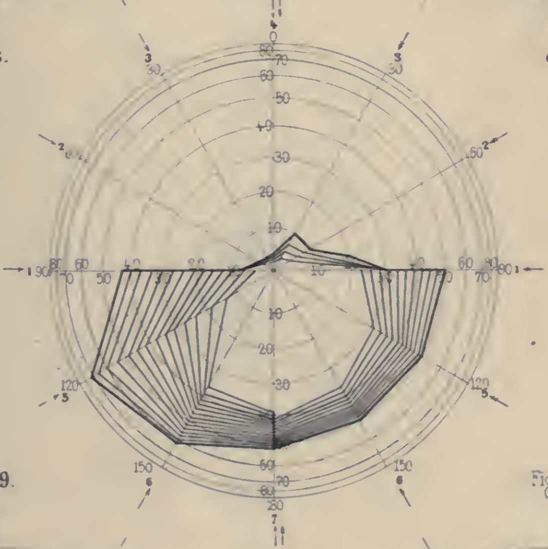
o.s.

Fig. 17



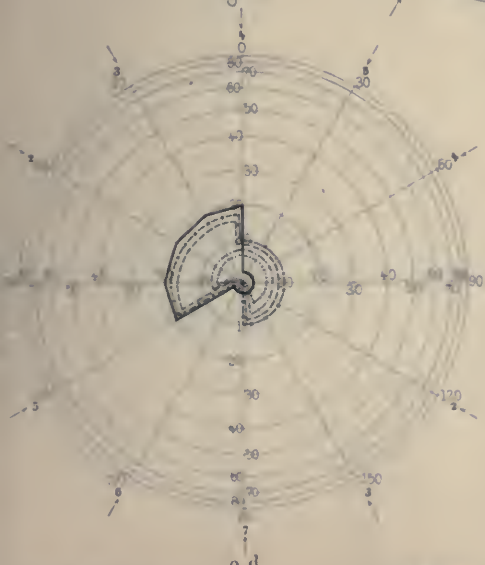
o.d.

Fig. 18.



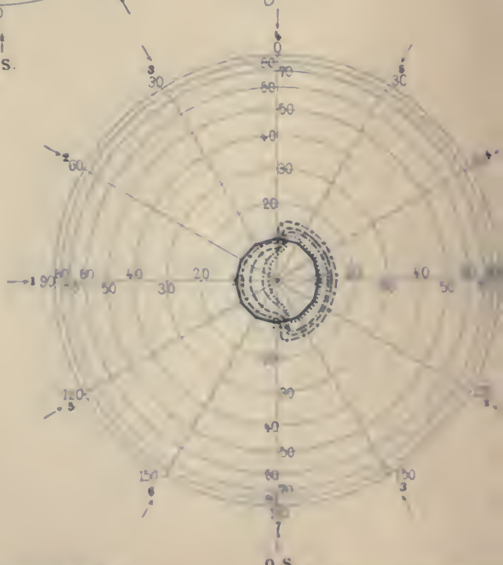
o.s.

Fig. 19.



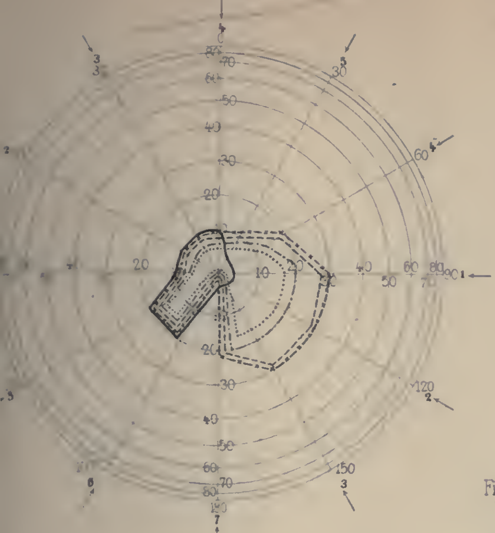
o d

Fig. 20.



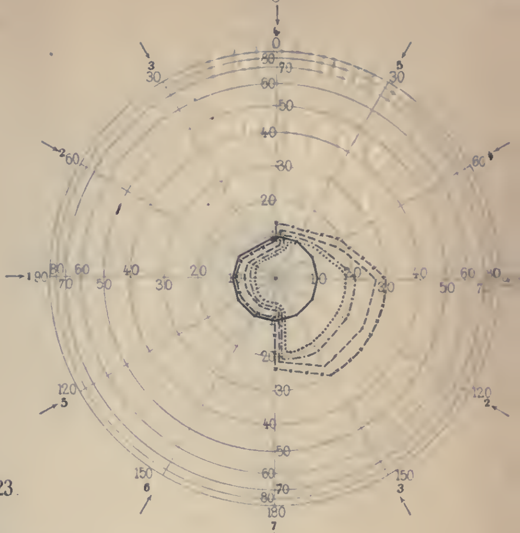
o s.

Fig. 21



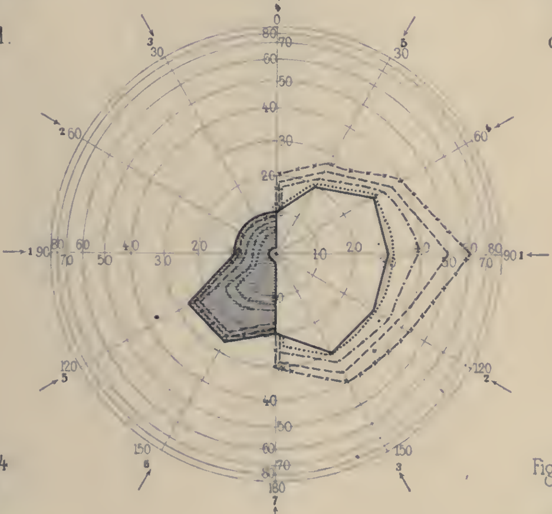
o.d.

Fig. 22



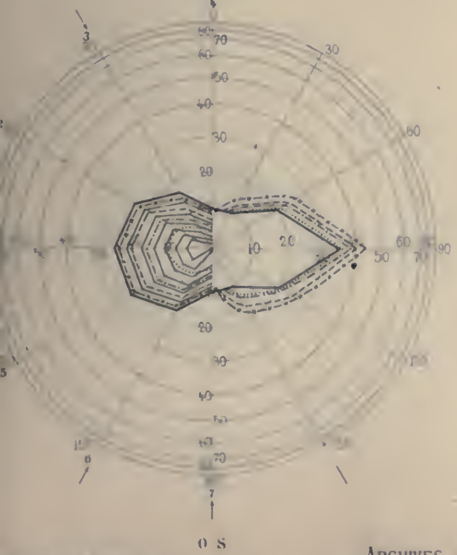
o.s.

Fig. 23.



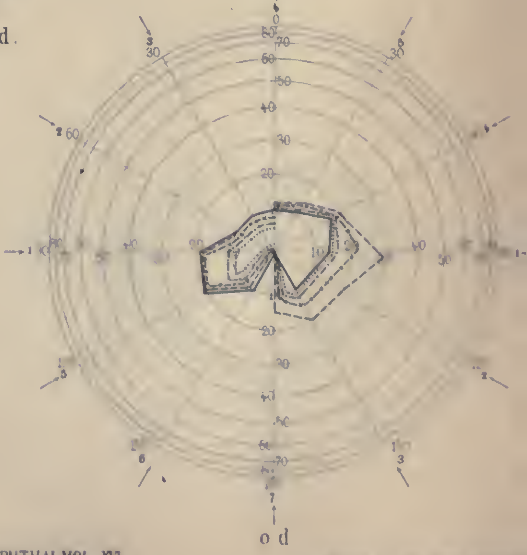
o d.

Fig. 24



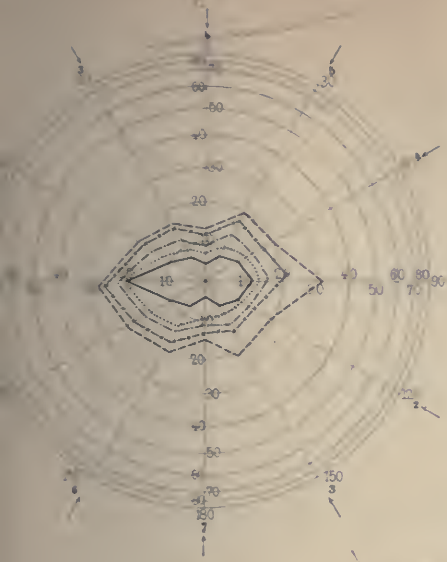
o s

Fig. 25



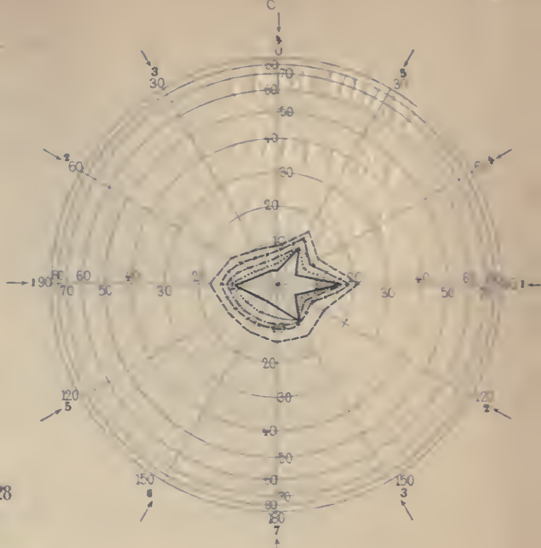
o d

Fig 26



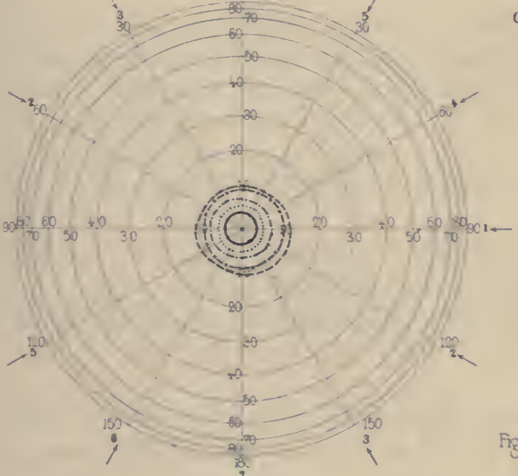
o.S

Fig 27



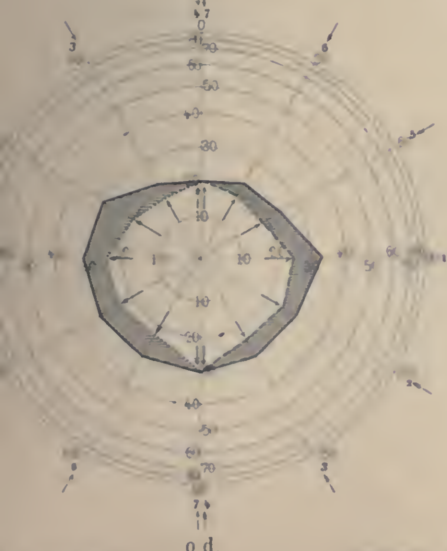
o.d.

Fig 28



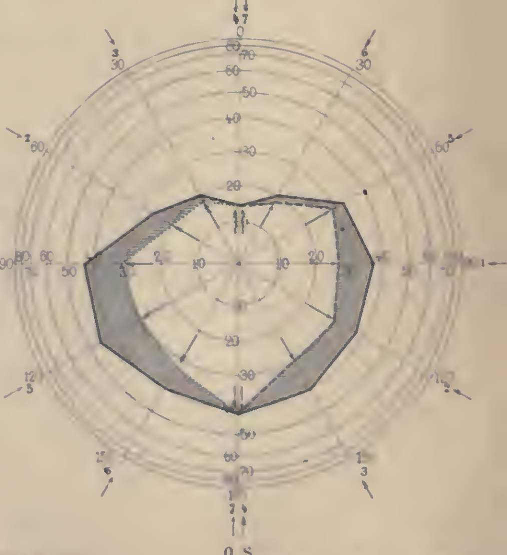
0 S

Fig 29.



o d.

Fig. 30.



0.S

v F. Wirtz Darmstadt

Verlag v J F Bergmann, Wiesbaden

temporal half of the V F I examined the nasal half of the V F and found its limits normal.

The examination of the V F of the other (R) eye showed the nasal half, which corresponded to the temporal half of the left, contracted in the same degree, *i. e.*, to about 8°. The other (temporal) half was unchanged.

This result again strengthens our previous conclusion *that fatigue does not affect the retina, but the occipital lobe;* in other words, we have not to deal with a retinal but a cortical process.

Similar examinations of one *quadrant* of each eye of our, now rested, first patient yielded like results, as is seen in figures 9 and 10.

Continued investigations furnished diverse, in part surprising results, but all are intelligible and afford an insight into the condition of both occipital lobes at the time.

Simultaneous and homonymous excitation of one eye showed the following conditions in the other:

A. The degree of excitation remaining the same for all meridians:

1. The fatigue was concentric and equal in both. (Case 2, figs. 5 and 6; case 3, a neurasthenic man of twenty-three years. Four successive examinations reduced V F gradually by 18°; in the other eye the same by transmission.)

2. Only one half of the V F of one eye, and by transmission the corresponding half of the other eye, can be fatigued, showing:

(*a*) A contraction of V F equal in both. (Case 4, neurasthenia; case 5, hysteria; figs. 11 and 12, pl. vii.; case 6, hysteria.)

(*b*) The contraction of the homonymous half of the V F of the second eye resembles that of the first, but is less in degree. (Case 7, neurasthenia; contraction in first, 20°; in second, 10°.)

3. Regular concentric contraction in one eye induced contraction only in one half of the V F of the other. (Case 8, hysteria, figs. 13 and 14.)

4. While one half of the V F contracts, the other half

dilates in the same degree; the same condition is induced in the homonymous halves of the other eye. The same irritation diminished the function in one half of V F, while in the other it acts as an excitant. (Case 1, hysteria, figs. 15 and 16.)

5. The examination at first dilates the V F, but if continued, restores the former limits, without further contraction. (Case 9, neurasthenia. The dilatation was 3°.)

B. The degree of the co-excitation is uniformly increasing or decreasing in the adjacent meridians of one half of V F, but remains unchanged in each single meridian.

This category is represented by two cases only.

The co-excitation was a fatigue in both, the V F was contracted. (Case 10, hysteria; figs. 17 and 18, superior hemiopia; case 11, hysteria; the examination induced an hysteric seizure.)

It could easily be supposed that the fatigue of one half of the V F would affect the homonymous half of the other in a similar way. Experiments have verified this supposition. (Case 2, figs. 7 and 8; case 4; case 12, hysteria; case 13, hysteria, figs. 23 and 24; with anomalous color-fields; figs. 19 and 20, 21 and 22, 25 and 26, 27 and 28, found in the course of 12 days. Case 14, neurotic, apoplectic surprise.)

In a number of healthy persons, examined in the same way for the sake of comparison, the limits of the V F did not change.

In all cases in which a concentric limitation of the field existed, it depended on a pure disturbance of the cerebral functions or a disturbance complicated with an organic lesion. In all these cases a further limitation could be produced by continued examinations of the V F.

Figs. 29 and 30, plate x., represent the contractions of the V F F obtained, when first the outer limit only is determined, but then the extent of each meridian is measured by carrying the visual object from one side of the meridian to the other. A limitation is noticed at the end where the visual object is carried last.

Reviewing the preceding statements we arrive at the following conclusions:

1. The so-called fatigue, and the anomalous excitability, of the retina must be regarded as a fatigue of the cortex of the occipital lobes. It is found:

(*a*) In all conditions heretofore erroneously designated as anæsthesia or hyperæsthesia of the retina. It may occur in purely functional affections (hysteria, hypochondria, neurasthenia), and in organic lesions of the central nervous system.

(*b*) In transient psychical alterations (also in healthy persons).

2. The limitation of the periphery of a sector of the V F has no influence on the periphery of an adjacent sector or any other part of the same V F.

3. The fatigue of the visual centre produced by the examination in one eye is transmitted in a definite manner to the fibres for the other retina that govern homonymous parts in the visual fields.

4. The limitation of homonymous retinal fields is incompatible with Wernicke's views on the projection of the visual centre, according to which there is in each occipital lobe a demarcation line of the homonymous halves of the retinæ corresponding to the vertical lines of separation of the two visual fields.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY DURING THE FOURTH QUARTER OF THE YEAR 1886.

By H. MAGNUS, Breslau ; C. HORSTMANN, Berlin ; and A. NIEDEN, Bochum.

WITH THE CO-OPERATION OF

C. E. Fitzgerald, Dublin ; E. Marckwort and P. von Mittelstädt, Antwerp ; Dantone, Rome ; Hirschmann, Charkow ; S. M. Burnett, Washington ; Schjötz and Ole Bull, Christiania, etc.

Sections I.–V. Reviewed by Prof. H. MAGNUS.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

a.—TEXT-BOOKS, MONOGRAPHS, TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS.

440. Eversbusch. German ophthalmology at the close of the eighteenth and the beginning of the nineteenth century. *Münchener med. Wochenschr.*, 1886, No. 27.

Eversbusch (440) mentions particularly J. A. Schmidt among the oculists prominent at the end of the last century. Schmidt has given a very accurate description of iritis and of the development of secondary cataract. Carl August Graefe almost recognized the true theory of accommodation and presbyopia.

441. Snell. Records and investigations into sixteen families of blind parents. *Brit. Med. Jour.*, Aug. 7, 1886.

442. Snell. Reports of the causes of blindnsss in 111 pupils in the Sheffield Institution for the Blind. *Brit. Med. Jour.*, Feb. 27, 1886.

Snell (441) records an investigation into sixteen families of blind parents. All these children had good sight. There were twenty-seven of them, which he considers shows that the marriages among the blind are unfruitful. Maxwell.

Snell (442) found the percentage of the causes of blindness as follows :

Blennorrhœa neonatorum	34.2 %
Other conjunctival affections	7.9 "
Sympathetic ophthalmia	9.0 "
Accidents to both eyes	2.7 "
Small-pox	4.5 "
Fevers	3.6 "
Congenital cataract	4.5 "
Congenital blindness (various causes)	6.3 "
Atrophy of optic nerve	18.0 "
Corneal opacity	5.4 "
Iridochoroiditis	0.9 "
Retinitis pigmentosa	0.9 "
Miscellaneous	2.1 "

b.—STATISTICAL PAPERS.

443. Alexander. Eighth annual report of the Ophthalmic Hospital at Aix-la-Chapelle, 1887.

444. Badal. Recherches statistiques sur les manifestations oculaires de la syphilis. *Arch. d'ophth.*, No. 4, 1886.

445. Boston. Sixty-first annual report of the Charitable Eye and Ear Infirmary for the year 1886.

446. Emerson. Statistics illustrating the etiology of paralysis of the ocular muscles. *N. Y. Med. Jour.*, May, 1886.

447. New York Ophthalmic and Aural Institute. Seventeenth annual report for the year Oct., 1885, to Oct., 1886. New York.

448. Philadelphia. Twenty-sixth annual report of the German Hospital of the city of Philadelphia for 1885.

449. Simi. Ospedali riuniti di Lucca (servizio ottalmico). *Boll. d'ocul.*, vol. viii., 11 and 12.

Alexander (443) treated 1,959 new patients and performed 276 operations, among them 13 extractions of senile cataracts.

Badal (444) found affections of the muscles in 144 cases, being 22 % of the whole number of cases of syphilis of the eyes. In 107 of these 144 the oculomotor nerve was affected, in 28 the superior oblique, in 4 the abducens, in 2 the fifth, in 2 the facial nerve. In 76 there were complications as follows :

Amblyopia, atrophy	26 cases	= 20 %
Ataxia	18 “	= 13 “
Iritis, retinitis, choroiditis	13 “	= 10 “
Paralysis of other nerves	10 “	= 7 “
Hemiplegia	4 “	= 3 “
Deafness	4 “	= 3 “
Keratitis	1 “	= 0.8 “

Paralysis of the muscles occurs most frequently in the first and in the tenth year after infection. The optic nerve was affected in 22 %, in 82 cases in form of atrophy, in 38 of neuritis, in 16 of neuro-retinitis, and in 3 of choked disc. Atrophy occurs oftenest in the eleventh year after infection; it was complicated as follows:

Ataxia	in 28 %
Paralysis of oculomotor nerve	“ 25 “
Disturbance of intellect and progressive paralysis	“ 16 “
Iritis, choroiditis, retinitis	“ 16 “
Paralysis of superior oblique	“ 11 “
Myosis	“ 11 “
Hemiplegia	“ 10 “
Deafness	“ 7 “
Various tertiary symptoms	“ 5 “
Cataract	“ 2 “
Epilepsy	“ 2 “
Paralysis of fifth nerve	“ 1 “
“ “ abducens	“ 1 “

Emerson (446) presents statistics of 64 cases of paralysis of the ocular muscles; in 36 the oculomotor nerve was affected, in 23 the abducens, in 3 the superior oblique; ophthalmoplegia externa was found in 2 cases. In 28 % syphilis proved to be the cause. In 61 cases only one eye was affected; in 3 both. The ratio of males to females was 44:20.

In the Massachusetts Charitable Eye and Ear Infirmary (445) 8,558 eye-patients were treated. One fourth had affections of the conjunctiva. Extractions according to Graefe, 86. Exact statistics of 108 cases of extractions are given, to which we would call special attention.

In the New York Ophthalmic and Aural Institute (447) 5,346 eye-patients were treated, one fourth of whom had affections of the conjunctiva; the number of diseases of the cornea was almost as great. Number of operations, 563; among them 52 extractions according to Graefe; in 49 the result was good; in one moderate; two were failures. Burnett.

The OPHTHALMIC DIVISION OF THE GERMAN HOSPITAL AT PHILADELPHIA (448) was under the charge of Dr. C. S. TURNBULL. Number of cases, 617 ; 75 operations, of which two were extractions of cataract ; 7 enucleations, 6 tenotomies, 11 iridectomies. BURNETT.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

a.—GENERAL PATHOLOGY AND THERAPEUTICS.

450. HOWE. On transplantation of the eye of the rabbit. *New York State Med. Assoc.*, 1886. Report on six transplantations, all of the eyes sloughing after a few days.

451. KNAPP, H. Remarks on pyogenic organisms with demonstrations and experiments. *Trans. Amer. Ophth. Soc.*, 1886.

452. ROLLAND. De la panophthalmie. Nouveau procédé d'exstirpation de l'œil dans cette affection. Paris, 1886.

453. SCHIFF. Sur les causes des troubles dans la nutrition de l'œil qui surviennent après la section des nerfs de la cinquième paire cérébrale. *Arch. des sci. phys. et nat.*, Nov., 1886. He opposes the theory according to which the neuroparalytic disturbances of the eye are due to the loss of sensibility.

454. SCHWEIGGER. On enucleation and exenteration. *Berliner med. Gesellsch.*, Nov. 3, 1886.

KNAPP (451) demonstrated to the society the effects of operating on the eyes of rabbits with strict antiseptic precautions, and with instruments contaminated with staphylococcus pyogenes aureus. In every case in which the operation was done with the contaminated instruments destructive inflammation ensued. The other eyes were in good condition except one which had become accidentally inoculated. BURNETT.

ROLLAND (452) publishes another paper (*cfr. Rev. d'ophth.*, April, 1886, p. 213), in which he recommends enucleation in panophthalmitis and opposes exenteration as advocated by Graefe. He does not perform enucleation, however, when the patient notices flashes of light or similar symptoms, making it probable that the septic micro-organisms have entered the lymph-sheaths of the optic nerve ; neither does he operate when there are cerebral symptoms. Rolland performed enucleation in 70 cases of panophthalmitis without accident ; 10 others he has operated lately according to a method devised by himself : after the conjunctival incision the eye is cut open in the horizontal diameter from one end to the other, the interior is washed out with antiseptic solutions until the sclera is laid bare, and then the operation is completed. Finally the socket is washed out with antiseptic solutions. Rolland therefore performs exactly what other oculists would try to avoid,—the opening of the panophthalmitic globe.

MARCKWORT.

SCHWEIGGER (454) advocates exenteration in laceration of the cornea and sclera, and in minor injuries attended with purulent choroiditis. Resection of the optic nerve is indicated in sympathetic ophthalmia. In cases of malignant intraocular tumors enucleation should be performed.

b.—GENERAL DIAGNOSIS.

455. JACKSON, EDWARD. The best form and practical value of the shadow-test in the measurement of refraction. *Journ. Amer. Med. Assoc.*, Sept. 4, 1886.

JACKSON (455) has great confidence in the accuracy of the method when properly used. He uses by preference a plane mirror 1½ in. in diameter, and a small and brilliant point of light.

BURNETT.

III.—INSTRUMENTS AND REMEDIES.

a.—INSTRUMENTS AND TECHNICAL CONTRIVANCES.

456. DENNETT, W. S. Dyer's perimeter. *Trans. Amer. Ophth. Soc.*, 1886.

457. DIBBLE, L. S. A new perimeter. *Jour. Amer. Med. Assoc.*, Nov., 20, 1886.

458. HAY, G. On the combination of two cylindrical lenses. *Trans. Amer. Ophth. Soc.*, 1886.

459. HIRSCHBERG. An aseptic bandage. *Centralbl. f. prakt. Augenhk.*, 1886, p. 269.

460. JACKSON, EDW. Lens-series for the refraction ophthalmoscope. *Trans. Amer. Ophth. Soc.*, 1886.

461. KROLL. Stereoscopic pictures. Hamburg and Leipzig, 1886.

462. RANDALL, B. A. A modified Loring ophthalmoscope, with a disc of cylindrical lenses. *Trans. Amer. Ophth. Soc.*, 1886.

463. WICHERKIEWICZ. A suitable permanent bandage for cataract operations. *Centralbl. f. prakt. Augenhk.*, Dec., 1886.

DENNETT (456) has modified and improved the original instrument. It is now made self-registering. BURNETT.

DIBBLE (457) employs no new principle. He uses a quadrant only, but it is so set and arranged as to be easily manipulated; it weighs only twelve and a half pounds. BURNETT.

HAY (458) presents a mathematical solution of the question, for the essential parts of which he acknowledges his indebtedness to Prof. Oliver, of Cornell University. While in no important respect superior to Dr. Jackson's solution, presented at the same meeting, it is worked out in a more elegant matter.

BURNETT.

HIRSCHBERG (459) applies over the ordinary aseptic bandage a roller made of prepared gauze, which has lain in a sublimate solution 1 : 1,000. When applied moist it soon becomes hard, and remains in position 2–3 days.

According to JACKSON (460) the most useful and convenient series of lenses for the refraction ophthalmoscope is the following: Convex: 0.5, 1., 1.5, 2., 2.5, 3., 3.5, 4., 4.5, 5., 5.5, 6., 7., 8., 9., 10., 11., 12., 15., 20. Concave: 0.5, 1., 1.5, 2., 2.5, 3., 3.5, 4., 4.5, 5., 5.5, 6., 7., 8., 9., 10., 12., 15., 20., 30., 50. BURNETT.

KROLL (461) has designed 25 stereoscopic plates, which are to be used not only for suppressing incipient strabismus but also after tenotomy. The pictures are excellent, and the reviewer has used them with the greatest advantage. They are especially useful in the after-treatment of strabismus, making the effect of the operation lasting, and preventing the subsequent development of secondary deviation. They are also very convenient for exposing simulants. The pictures are deserving of general recognition, but in the second edition the reviewer would suggest an increase in the number of letter-plates. The pictures form an important addition to the equipment of the oculist.

RANDALL (462) has added a disc of cylindrical lenses to the ordinary Loring ophthalmoscope. BURNETT.

WICHERKIEWICZ (463) uses a bandage similar to that described by Hirschberg.

b.—REMEDIES.

464. COGGIN, DAVID. Protracted action of hydrobromate of homatropine in spasm of the accommodation. *Amer. Jour. Ophth.*, July, 1886.

465. CLAIBORNE, J. H. Peroxide of hydrogen as a thera-

peutic agent in diseases of the eye. *N. Y. Med. Jour.*, Sept. 11, 1886.

466. **Haynes**, S. Balsam copaiba in gonorrhœal ophthalmia. *Med. Record*, Oct. 9, 1886.

Coggin (464) found that a drop of a solution (1 : 60) of hydrobromate of homatropine, twice repeated at ten minutes' interval, suspended the power of accommodation for four days.

Burnett.

Claiborne (465) has made experiments with peroxide of hydrogen in conjunctival and corneal troubles, but has not found sufficient benefit to justify a continuance of its use.

Burnett.

Haynes (466) used local application of balsam copaiba in a single case, applied to the brows, lids, and a little inside the lids, after thorough cleansing, three times a day. The patient made a good recovery. Dr. I. Beermann, of Washington, informs me that he used the same remedy some years ago and published his results with it.
Burnett.

IV.—ANATOMY.

a.—GENERAL ANATOMY.

467. **Flemming.** Chart of the human eye. Brunswick, 1887. Demonstrated before the meeting of naturalists at Berlin, 1886.

468. **Haensell.** La méthode de l'inclusion du globe oculaire dans la paraffine et dans la celloidine. *Bull. de la clin. nat. ophth. de l'hôp. des quinze vingts*, vol. iv., 4.

469. **Landesberg.** Contributions to the knowledge of the congenital anomalies of the eye. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 399.

470. **Randall**, B. **Alex.** The underlying conus. *Amer. Jour. Ophth.*, Nov., 1886.

Flemming (467) has prepared an excellent drawing of a horizontal section of the right eye on the scale of 30 : 1. The development of the various parts is clearly indicated by special coloring. A few inaccuracies in the nomenclature might be corrected. The chart is certainly very useful.

To obtain uniform hardening of the globe and fixation of the various tissues **Haensell** (468) places it in a solution, containing a few drops of acetic acid, of the following composition : 25 volumes of a watery solution of chromic acid, 10 vols. of a saturated watery solution of picric acid, 65 vols. of distilled water. If it is desired to harden the retina in particular and keep it in position, 2 vols. of a 1-per-cent. solution of osmic acid must be added. After three or four days the eyeball is taken out, cut in two, washed out in water for several days, and then placed in alcohol or Müller's solution for further hardening. Another method of hardening consists in placing the globe in 40, 60, 80, and 90 per cent. alcohol successively for twenty-four hours at a time. For embedding in celloidin or paraffin, see the continuation.

V. MITTLESTÄDT.

RANDALL (470) presents the history of a case, accompanied with drawings of the "conus nach unten" (the crescent below), as described by Fuchs and Szili. BURNETT.

b.—COMPARATIVE ANATOMY.

471. PRÖBSTING. Contribution to the finer anatomy of the lid and conjunctiva of man and the ape. *Zeitschr. f. vergl. Augenhk.* Wiesbaden, 1886, and Inaug.-Diss., Erlangen, 1886.

472. WÜRDINGER. The comparative anatomy of the ciliary muscles. *Zeitschr. f. vergl. Augenhk.* Wiesbaden, 1886, and Inaug. Diss., Würzburg, 1886.

WÜRDINGER (472) has examined the ciliary muscle in a large number of animals, and found in all of them organic fibres in the ciliary body. The development of the ciliary muscle, *i. e.*, its size in proportion to the size of the animal and eye differs very much, and depends on the mode of living.

c.—CORNEA.

473. SCHÖBL. The blood-vessels of the cornea in the normal and pathological condition. *Centralbl. f. prakt. Angenhk.*, Nov., 1886. This paper was followed by polemics in the December number of 1886 and the January number of 1887.

SCHÖBL (473) has obtained the following results : (1) There is no præcorneal network of blood-vessels in the fœtal eye. (2) Besides the superficial marginal network, there is a second deeper one. (3) The pathological blood-vessels in superficial conjunctival keratitis come from the superficial network ; the pathological blood-vessels in deep-seated scleral keratitis come from the deep system. (4) The superficial corneal blood-vessels ramify dendritically, the deeper ones like broom-corn.

d.—REFRACTIVE MEDIA AND NERVOUS APPARATUS.

474. SCHÖN. Zonula and membrana limitans of the vitreous. *Arch. f. Ophth.*, vol. xxxii., 2.

SCHÖN (474) maintains that there are zonula-fibres between the anterior and posterior ones, which are attached close to the æquator of the lens, and radiating like a brush, attach themselves to the capsule. He also maintains the existence of the membrana hyaloidea.

475. DARKEWITSCH. The so-called centres of the optic nerve and their connection with the cortex of the cerebrum. *Arch. f. Anat. u. Phys.*, anat. part, 1886, Nos. 3 and 4.

476. DARKEWITSCH. The pupillary fibres of the optic tractus. *Wratsch*, No. 43.

477. DENTI. Caso singolarissimo di bilaterale congenita mancanza dei vasi retinici con opacita catarattosa bilaterale posteriore pure congenita. *Gaz. med. ital. Lomb.*, vol. xlvi., No. 32, p. 323.

DARKEWITSCH (475) disproves Bechterew's view, and shows that only one centre exists for the fibres of the optic nerve, the upper eminences of the corpus quadrigeminum. A number of fibres come from the glandula pinealis and the ganglion habenulæ, which join the fibres of the optic nerve in the outer corpus geniculatum, and may be considered pupillary fibres. The fibres of the optic nerve do not cross in the corpora quadrigemina in the manner assumed by Charcot. Only the upper corpus quadrigeminum is connected with the cortex by a special bundle of fibres, but not the outer corpus geniculatum and the pulvinar.

MAGNUS.

DARKEWITSCH (476) concludes, from previous and recent experiments on rabbits, that in the glandula pinealis, and in the ventral portion of the commissura cerebri posterior, the fibres are found which transmit the sensation of light from the retina to the nuclei of the oculomotor nerve. He proves his views not only by atrophy experiments, but also by direct destruction.

HIRSCHMANN.

DENTI (477) observed a woman aged twenty-four in whom there were absolutely no retinal blood-vessels visible. Vision was diminished by opacities at the posterior pole of the lens, but the field of vision and color-perception were normal. The author considers the condition congenital, and of course believes that the retina was nourished by anastomoses with the blood-vessels of the choroid. DANTONE.

V.—PHYSIOLOGY.

a.—GENERAL AND COMPARATIVE PHYSIOLOGY.

478. ANDREWS, J. A. The electric light as an illuminator. *Trans. Am. Ophth. Soc.*, 1886, and *Med. Rec.*, Sept. 4, 1886.

ANDREWS (478) comes to the following conclusions: that the arc-light, when modified by opal or ground-glass shades, is not so objectionable; but gazing at the arc-light not protected for many seconds is attended with great risk. The arc-lamp in its present state is unsuitable and positively harmful, particularly on account of its unsteadiness. The Edison incandescent light he deems the best. BURNETT.

b.—COLOR-PERCEPTION.

479. ALBINI. Della visione indiretta della forme e dei colori. *Giorn. d. r. Accad. di med. di Torino*, vol. xlix., 7 and 8.

480. DENNETT, W. S. Holmgren's and Thomson's worsteds in a new form. *Trans. Amer. Ophth. Soc.*, 1886.

481. FOX, L. W., and GOULD, G. M. The human color-sense considered as the organic response to natural stimuli. *Amer. Jour. Ophth.*, Sept., 1886.

482. FOX, L. W., and GOULD, G. M. On heat considered as the retinal intermediate of light- and color-sensation. *Amer. Journ. Ophth.*, July, 1886.

483. FOX, L. W., and GOULD, G. M. Retinal insensibility to ultra-violet and infra-red rays. *Amer. Journ. Ophth.*, Dec., 1886.

484. OLIVER, C. A. A new series of Berlin wools for the scientific detection of subnormal color-perception. *Trans. Amer. Ophth. Soc.*, 1886.

485. SEWALL, HENRY. A simple method of testing for color-blindness. *Med. News*, Dec. 4, 1886.

ALBINI (479) has measured the refraction and color-perception of the peripheral parts of the retina. He found that the refraction decreases from the point of fixation towards the periphery in a constant and quite regular manner, the diminution sometimes amounting to 4 D at the boundary of the horizontal meridian, to 2 D at the boundary of the vertical meridian. As regards color, three persons were tested for blue, red, and green in the same directions and at the same distances, and it was found in all that by using convex glasses the field of vision for colors could be enormously and almost evenly extended, so that it nearly reached that of white. The power of the lenses necessary for this increases from blue to red (for blue + 6 to + 9.50 D were required, for red + 7 to + 10.5 D, for green + 9 to + 12 D), is therefore inversely proportional to the extent of the normal field of color-perception. DANTONE.

DENNETT (480) uses worsted spheres in the place of skeins, and each sphere has a numbered tag. There are three empty trays, each lined with one of the three principal test-colors. The balls are to be distributed into the trays according to their colors as they appear to the person examined. BURNETT.

FOX and GOULD (481) attempt to answer, in accordance with the laws of evolution, the questions as to why certain colors are called primary, why the relative amounts of primary colors vary as they do in the normal spectrum, and to explain the differences in the objective or luminous intensities of colors, and to give the reason of the differences in their subjective intensities and qualities. BURNETT.

FOX and GOULD (482) attempt to establish by *a priori* reasoning and some experiments, which it would be impossible to detail in this short abstract, the very close analogy between the sense of sight and the sense of temperature. They also hold the retina to be a receiving and transmuting membrane, and not in any sense a differentiating one. These views are defined from a physical, a physiological, a chromatological, and a psychological standpoint. The inadequacy of the Young-Helmholtz and the Hering theories for the explanation of the phenomena of vision, is pointed out. In a postscript the authors acknowledge that essentially the same views had already been advanced by the Reviewer in 1884. It may be proper to state here that the Reviewer published an abstract of his views in these ARCHIVES in March, 1881.

BURNETT.

FOX and GOULD (483) advance the teleological argument in explanation of the limit of perception of ethereal undulations by the organ of vision, pointing out what they consider disadvantages that would arise if the eye took cognizance of the infra-red and ultra-violet rays. BURNETT.

OLIVER (484) has enlarged and modified Holmgren's method. There are five principal test-skeins, to which he gives the Latin names "viridis," "ruber," "cœruleum," "flavus," and "rosa"; a series of twenty small pure match-skeins; and a series of seventy-two small confusion match-skeins. Printed instructions accompany the series, so that it may be used by intelligent laymen.

BURNETT.

SEWALL (485) has modified Holmgren's method in having the worsteds arranged in graded rows of shade on a cardboard, each color being on a separate card and each tint numbered A, B, etc. The person examined is required to point out on the cards the particular shades or tints corresponding to the test-color, as in the Holmgren method. BURNETT.

Sections VI.–X. Reviewed by DR. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

486. ADAMÜCK. The question of school-myopia. *Wjestnik Ophth.*, vol. iii., 6. (Contin. and conclusion.)

487. FROST, A. Ophthalmoplegia interna. *Ophth. Soc. Unit. Kingd.*, Oct. 21, 1886.

488. JACKSON, EDW. The equivalence of cylindrical and sphero-cylindrical lenses. *Trans. Amer. Ophth. Soc.*, 1886.

489. LORING, E. G. Dioptric, dioptre, dioptrie, or dioptry. *N. Y. Med. Jour.*, July 24, 1886.

The metre-lens: its English name and equivalent. By S. M. BURNETT. *Ibid.*, Aug. 14, 1886.

Dioptric or Dioptry. By E. G. LORING. *Ibid.*, Sept. 25, 1886.

Dioptry or Dioptric. By H. KNAPP. *Ibid.*, Oct. 2, 1886.

The Dioptry Again. By S. M. BURNETT. *Ibid.*, Oct. 2, 1886.

490. MADDOX, E. Investigations on the relations between convergence and accommodation. *Ophth. Rev.*, 1886, vol. iv., 62, p. 341.

491. MARTIN, G. Etude sur les contractions astigmatiques du muscle ciliaire. *Ann. d'ocul.*, vol. xcvi., pp. 82 and 217. (Contin. and conclusion.)

492. NORRIS, W. F. Some remarks on asthenopia and the changes in refraction in adolescent and adult eyes. *Trans. Amer. Ophth. Soc.*, 1886.

493. OLIVER, C. A. A series of metric test-letters and words for determining the amount and range of accommodation. *Trans. Amer. Ophth. Soc.*, 1886.

ADAMÜCK (486) examined every year for nine successive years, the refraction of the same group of scholars of two high schools at Kasan, from the lowest class to the highest. The number of scholars examined was 317. In the lowest class he found nearly the same percentage of the various forms of refraction as in his clinic, namely, hypermetropia 52.6 %, emmetropia 33 %, and myopia 14.2 %. $V < \frac{20}{20}$ was found in 10 % of all cases, oftenest in myopia, most seldom in hypermetropia. None of the children was color-blind. For the details of the tables, which contain the age, vision, refraction, ophthalmoscopic appearance, power of adduction and pupillary distance of every scholar from year to year, as well as the analysis of every case, see the original.

Adamück found that the refraction increased in all eyes, though not in the same degree; in those originally myopic it increased in 90.9 %; in those originally emmetropic in 32 %; in those originally hypermetropic in 51.6 %. The author attributes great influence on the development of myopia to the length of the basal line, although frequently no direct connection between the two could be shown. Congenital disposition is of great importance, and frequently manifests itself in the ophthalmoscopic appearance by greater pigmentation or absence of pigment in shape of a crescent at the edge of the papilla. In progressive myopia the development of shortsightedness precedes that of the crescent.

HIRSCHMANN.

FROST (487) reports a case of paresis of accommodation, which had existed for four months. The pupil reacted. The patient was perfectly well, but the knee-jerk was absent. He was cured with iodide of potassium.

JACKSON (488) shows, in the form of four propositions, that all combinations of cylinders with their axes crossed at right angles or obliquely, are either sphericals or sphero-cylinders, according to the relative power of the two lenses and the angle of crossing of their axes. The method of finding the equivalent of any thus superimposed cylindrical lenses by the construction of a parallelogram is not new we believe, but a restatement of that made by Stokes in the description of his original lens. BURNETT.

The papers of LORING, BURNETT, and KNAPP (489) contain a discussion mainly between Loring and Burnett, as to the English name for the metre-lens and its inch equivalent. Loring uses *dioptric*, and gives it a value of 36 in. (French). Burnett contends that *dioptry* is preferable, being more in accordance with the derivation of the word, and less confusing, dioptric being also an adjective, and that Americans should use the English inch with which they are supposed to be most familiar, forty of them (approximately) being in one metre. Knapp favors dioptry.

BURNETT.

MARTIN (491) publishes in the *Ann. d'ocul.* the continuation and conclusion of his voluminous paper on the astigmatic contractions of the ciliary muscle, which are intended to correct the corneal astigmatism either entirely or in part. Martin distinguishes between two kinds of contractions : "elastiques" he calls those which disappear when the glass correcting the astigmatism is put before the eye ; "renitentes," those which persist in spite of the correcting glass. While the elastic contractions disappear even under cocaine, the renitent resist this remedy, but yield to atropine. In the Sept.-Oct. number he still upholds the theory that partial contractions of the cilliary muscle of 2.5 D are excessive, but in the Nov.-Dec. number, he recalls this statement, and publishes cases of much greater partial contractions (up to 4.25 D) ; they never, however, manifested themselves, but only on fixation at a distance of 17 *cm.* Partial contractions are found in about one half of all astigmatic eyes, and decrease with age ; they persist for a remarkably long time in nervous individuals and persons suffering with hemicrania. In younger people also these contractions sometimes disappear after enfeebling constitutional diseases, but reappear as the patient becomes stronger. The renitent contractions do not produce any asthenopic symptoms, while the elastic do. The latter therefore must be corrected, but not the former. Corneal astigmatism must therefore be corrected only to the extent revealed by the subjective examination without instillation of atropine, and not that portion of it which becomes apparent after the use of atropine. Sometimes, but rarely, a total astigmatism is found greater than the corneal astigmatism ; in these cases asymmetry of the lens increases the homonymous asymmetry of the cornea. An over-correction of corneal astigmatism by too energetic contractions of the ciliary muscle rarely occurs, but the existence of such cases is certain. Martin found it among three thousand persons, the refraction and ophthalmoscopic appearance of whose eyes he closly examined forty-five times. MARCKWORT.

NORRIS (492) believes that that the strain of asthenopia causes congestion, leading to the distention of the tissues, not only of the posterior but also of the anterior portion of the eyeball, and of the lids, and that the strain should be relieved by the use of proper glasses, and that the refraction should be measured under a strong mydriatic. BURNETT.

OLIVER'S (493) card is a reduction of the scale, with some modification as to the arrangement of the words which he presented at the last meeting of the society. The words are composed of black letters, the lines of which subtend the accepted smallest visual angle at the distance for which they are numbered. It is very conveniently mounted, and is made by Queen & Co., Philadelphia. BURNETT.

VII.—LIDS.

494. DE BECK, DAVID. Hard chancre of the eyelids and conjunctiva. Contributions from the ophthalmic clinic of the Med. Coll. of Ohio, No. 3, July, 1886.

495. GREEN, JOHN. Operative treatment of entropium. *Amer. Journ. Ophth.*, Dec. 1886.

496. MITTENDORF, W. F. Two epidemics of molluscum contagiosum. *Trans. Amer. Ophth. Soc.*, 1889.

DE BECK (494) gives the history in full of a single case of his own and presents a very full and complete résumé of all the hitherto published cases, properly tabulated together with nine unpublished cases. The monograph is illustrated with four very good chromo-lithographs and two wood-cuts, and is probably the most extensive record of the subject to date. BURNETT.

GREEN'S (495) article is a continuation of one begun in the first volume (1883) of the *Journ. of Ophth.*, in which he gives a description of his entropium operation founded upon the procedure of the ancients as described by Celsus, Ætius, and Paulus Æginata. Its essential features are the under incision of the conjunctiva and tarsus and a turning forward of the loosened tissue, containing the cilia, by means of sutures, combined or not with an excision of a part of the lid integument. The paper contains abstracts of the original Latin and Greek, not easily accessible to the general reader. BURNETT.

MITTENDORF (496) found that in two separate institutions for the care of children, after the admission of one child having the tumors on the lids, a large number were affected in the same manner in the course of a few months. The best plan of treatment was found to be excision with the scissors and cauterization of the base with the arg. nitr. stick. BURNETT.

VIII.—MUSCLES AND NERVES.

497. Blanc, E. Le nerf moteur oculaire commun et ses paralysies. Paris, 1886, A. Dalahaye.

498. Brailey, W. Rapidly occurring blindness and complete ophthalmoplegia on one side, hysterical. *Ophth. Soc. Unit. Kingd.*, Oct. 21, 1886.

499. Claiborne, J. H. Advancement of Tenon's capsule. *Med. Rec.*, Oct. 2, 1886.

500. Coupland, Sidney. Ophthalmoplegia dependent upon thrombosis of the cavernous sinuses. *Ophth. Soc. Unit. Kingd.*, Oct. 21, 1886.

501. Featherstonehaugh, Thos. A case of insufficiency of the external recti muscles. *Amer. Journ. Ophth.*, Nov., 1886.

502. Gallenga. Della diplopia in certe forme di strabismo interno. *Rassegna di sci. med.*, vol. i., 9.

503. Hinde, Alfr. A study of herpes zoster frontalis seu ophthalmicus. *N. Y. Med. Record*, Sept. 11, 1886.

504. Knapp, H. Advancement of Tenon's capsule in strabismus. *Trans. Amer. Ophth. Soc.*, 1886.

505. Kollock, C. W. Partial paralysis of oculomotor nerve. *Jour. Amer. Med. Assoc.*, Sept. 18, 1886.

506. Prout, J. S. Badal's operation, or laceration of the infratrochlear nerve for the relief of glaucoma, etc., with cases. *Am. Jour. Ophth.*, July, 1886. *Trans. Amer. Ophth. Soc.*, 1886.

507. Standish, Myles. A case of alcoholic paralysis. *Boston Med. and Surg. Jour.*, April 22, 1886.

508. Stevens, G. T. A system of terms relating to conditions of the ocular muscles known as "insufficiencies." *N. Y. Med. Jour.*, Dec. 4, 1886.

509. Theobald, Samuel. The amblyopia of squinting eyes. *Med. News*, Sept. 4, 1886. *Trans. Amer. Ophth. Soc.*, 1886.

510. Webster, D. A case of successful laceration of the infratrochlear nerve—Badal's operation. *Amer. Jour. Ophth.*, July, 1886. *Trans. Amer. Ophth. Soc.*, 1886.

Blanc (497) first gives an anatomical description of the oculomotor nerve, its origin, its cerebral and orbital course ; next he treats of its normal functions, and then discusses the paralyses. He divides them into (1) rheumatic and reflex ; (2) paralyses due to changes in the blood, among which he classes those due to lead-poisoning, to poisoning with carbonic acid, sausages, the diphtheritic, syphilitic, diabetic, uræmic, and gouty paralysis. In the third group he ranges the paralyses of central, spinal, and traumatic origin. In the remaining chapters Blanc discusses the symptoms of paralysis of the oculo-motor nerve, describes complete and partial cases, the course, prognosis, and treatment.

BRAILEY'S (498) patient became totally blind in one eye in the course of three months. It was completely immovable, the pupil did not react, and there was ptosis. She was put under mixed treatment, whereupon perception of light and slight mobility slowly returned. The ophthalmoscopic appearance was normal. There were no signs of syphilis, but from the history of the case a psychosis was not improbable, neither could hysteria be excluded.

CLAIBORNE (499) reports a successful case of capsular advancement done according to the method of de Wecker. BURNETT.

COUPLAND (500) observed in an unmarried woman, aged forty-five, the development in both eyes of proptosis and ophthalmoplegia externa, and in the left of ophthalmoplegia interna also. Other cerebral symptoms then manifested themselves, and the patient died. The autopsy revealed meningitis basilaris and thrombosis of the cavernous sinus.

FEATHERSTONEHAUGH'S (501) patient, a young man aged twenty-four, had an insufficiency of the external recti muscles of 17°. It was relieved by tenotomy of the interni ; the power of convergence was very much increased, probably from gymnastic exercise. BURNETT.

GALLENGA (502) describes six cases of convergent strabismus in which there was at the same time incongruity of the retinæ. Accurate and repeated ophthalmometric measurements revealed marked but constant differences in the size of the squint angle and of the angle of the same eye, due to the fact that sometimes the eye fixed with the macula lutea, sometimes with another centre of vision farther inward. Diplopia occurred frequently or could be easily produced. Three of the patients were brothers and sister and had three others who also squinted, but did not possess the second centre of fixation. DANTONE.

HINDE (503) believes, from a study of one case and a large amount of literature bearing on the subject, that the phenomena of herpes zoster frontalis are due to neuralgic disease of the ophthalmic branch of the fifth pair, due to asthenia of the nerve tissues and in the large majority of cases of central origin. As to treatment, he regards eserine as the remedy *par excellence.*

BURNETT.

KNAPP (504) has done the operation ten times, differing, however, somewhat from the plan originally devised by de Wecker. He advances the whole of the anterior portion of the vertically folded muscle and passes a suture through it intending to get a plastic inflammation which shall result in a shortening and contraction of the parts. It is really an advancement of the muscle without detaching it. The results have been very satisfactory.

BURNETT.

KOLLOCK (505) reports the case of a colored woman of thirty, who two months after confinement was taken sick with pains in the head and was unconscious for a month. On recovery the right lid could not be raised. In four months it regained its power, but there still remained retraction of the globe, and paralysis of the superior and inferior recti and inferior oblique and partial paralysis of the ciliary muscle and iris. This condition remains the same. BURNETT.

PROUT (506) performed the operation of Badal nine times on five patients, and from the results obtained in these cases, he thinks the operation deserving of trial, especially in cases unfit for operations on the eyeball. It cannot make matters worse as to the eyes, and the relief from pain, even if temporary, is worth procuring at the cost of so slight an operation. BURNETT.

STEVENS (508) offers the following nomenclature : *Generic terms:* Orthophoria, a tending of the visual lines to parallelism ; heterophoria, a tending of these lines some other way. *Specific terms :* Esophoria, a tending of the visual lines inward ; exophoria, a tending of the visual lines outward ; hyperphoria (right or left), a tending of the right or left visual line in a direction above its fellow. *Compound terms :* Hyperesophoria, a tending upward and inward ; hyperexophoria, a tending upward and outward.

BURNETT.

THEOBALD (509) is of the opinion that the arguments against the suppression theory are not as yet sufficient to justify us in abandoning attempts to improve the defective eye in squint by practice and by prompt surgical interference. BURNETT.

In WEBSTER'S (510) case the eye was glaucomatous and painful, as a result of disorganization, due to ophthalmia neonatorum. The operation seems to have done positive and permanent good.

BURNETT.

IX.—ORBIT AND NEIGHBORING CAVITIES.

511. BOBONE. Sur le traitement opératoire de la maladie de Basedow. *Ann. d'ocul.*, vol. xcvi., p. 260.

512. CASTALDI. Epithelioma della regione sottorbitaria e del sopraciglio. Asportazione. Guarigione completa e permanente. Incurabile Napoli. Maggio-Giugno, 1886.

513. CRITCHETT and JULER. Orbital tumor. *Ophth. Soc. Unit. Kingd.*, Oct. 21, 1886.

514. DEMPSEY, A. Case of orbital aneurysm. *Brit. Med. Jour.*, 1886, p. 541. Bibliography.

515. GUAITA. Voluminosa esostosi dura dell' orbita demolita conservando il globo oculare. *Ann. di ottalm.*, vol. xv., Nos. 2 and 3, p. 205.

516. MORELLI. Cisti idatidea della cavità orbitaria sinistra. Enucleazione dell' occhio. Guarigione. *Riv. clin. e terapeut.*, vol. viii., 6, p. 281.

517. RICHET. Sarcome de l'orbite. Opération. *France méd.*, 1886, No. 108, p. 1289.

518. ROLLAND. De l' articulation orbito-oculaire; ses traumatismes, plaies, luxations, enucléations traumatiques. *Rec. d'ophth.*, 1886, No. 11, p. 657.

519. THOMPSON, J. H. An obscure case of exophthalmus. *Jour. Amer. Med. Assoc.*, Oct. 30, 1886.

520. WHITE, W. H. On the prognosis of secondary symptoms and conditions of exophthalmic goitre. *Brit. Med. Jour.*, July, 1886, p. 151.

BOBONE (511) discusses the cure of Basedow's disease by treating the hypertrophic rhinitis, which existed at the same time, with the galvano-cautery. MARCKWORT.

CASTALDI (512) has successfully extirpated from the orbit two severe cases of epithelioma, which were considered incurable, and compares at length the histological condition and difference in the arrangement of the tissues of the two tumors. DANTONE.

CRITCHETT and JULER'S (513) case was that of a young woman aged twenty-one, whose left eye had become prominent without diplopia. The cause was found in a tumor in the zygomatic region, which disappeared after using iodine of potassium.

GUAITA (515) removed an exostosis of 25 cub. *cm*, which had existed for fifteen years, from the orbit, and succeeded in preserving the globe. The tumor enclosed nearly the whole orbit like a shell, and projected at several points beyond the orbital margin. It sprang with a broad base from the ethmoid bone, and surrounded and dislocated the globe and other contents of the orbit. The optic nerve had suffered most from the pressure, and the eye had been blind for five years from atrophy of the nerve. The first symptom of disease was said to have been marked swelling of the lids, which was observed after sneezing violently. The author explains this by assuming that the lamina papyracea of the ethmoid bone was broken by the violent sneezing, and that the callus which then formed developed to an abnormal extent, filling the whole orbit. The tumor was very compact, but not of ivory hardness, and bore the impressions of the ocular muscles and the optic nerve. DANTONE.

RICHET (517) observed in a young man, aged twenty-four, a rapidly growing tumor in the region of the right eyebrow. It was removed and proved to be a sarcoma of the glandula lacrymalis superior et inferior, which had remained confined to these glands.
MARCKWORT.

ROLLAND (518) reports another case of traumatic enucleation of the eye. A man was struck with an umbrella in the hands of another with such force in the region of the inner canthus that the eye was completely enucleated and hung on the cheek by a few shreds. Tenon's capsule was not injured. The remaining attachments were severed with one stroke of the scissors, and the recovery was as rapid as after a regular operation. Rolland discusses the mechanical conditions of such an injury, basing his remarks on experiments on dead pigs and chloroformed rabbits.
MARCKWORT.

THOMPSON'S (519) case was that of a boy aged five, in whom, without any injury or serious illness of any kind, a gradually increasing exophthalmus of the right side developed, preceded by some paroxysmal pains on that side of the head. The eye protruded half an inch forward and slightly outward. No evidence of periostitis or cellulitis or tumor. In a few days, without other than external medication, the eye returned to its normal position. Vision was good and there was no papillitis. BURNETT.

WHITE (520) reports on twelve cases of morbus Basedowii, seven of whom died. Where recovery takes place, the symptoms do not disappear until five years after the beginning of the disease

As regards treatment, digitalis was of no benefit, belladonna of only slight, but the constant current proved useful.

MAXWELL.

X.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

521. ADAMÜCK. Remarks induced by the polemics of Reich and Iskersky on trachoma. *Wratsch*, 1886, No. 50.

522. ANDREWS, J. A. Contagious eye-disease. *N. Y. Med. Jour.*, Sept. 25, 1886.

523. DE CHRISTMAS-DIRCKINCK-HOLMFELD. La jéquiritine et ses effets. *Bull. de la clin. nat. ophth.*, vol. iv., No. 4, p. 157.

524. DICKINSON, WM. Pemphigus conjunctivæ. *Jour. Am. Med. Ass'n*, Nov. 20, 1886.

525. FANO. Polype du répli sémilunaire de la conjonctive. *Jour. d'ocul. et de chir.*, 1886, p. 221.

526. FONTAN. La tuberculose de la conjonctive et de la cornée. *Rec. d'ophth.*, 1886, No. 10, p. 577.

527. FRYER, B. E. The use of hot water in some of the conjunctival and corneal inflammations. *Trans. Am. Ophth. Soc.*, 1886.

528. GRASSELLI, G. Il jequirity nella cura della ottalmia granulo-tracomatosa. *Boll. d'ocul.*, vol. viii., No. 12, p. 390.

529. KAZAUROW. Observations on the actions of iodol in eye-diseases. *Wratsch*, 1886, No. 44.

530. MINOR, J. L. Boric acid powder in the treatment of granular lids. *N. Y. Med. Journ.*, July 31, 1886.

531. MITTENDORF, W. F. Conjunctival affections. *Med. and Surg. Rep.*, 1886, No. 24.

532. SCHTSCHEPKIN, J. The treatment of trachoma. *Wratsch*, 1886, No. 42.

533. SMITH, EUGENE. Transplantation of conjunctiva from the rabbit. *Journ. Amer. Med. Assoc.*, Sept. 25, 1886.

534. WEEKS, J. E. Ophthalmia neonatorum—its cause, prevention, and treatment. *N. Y. Med. Rec.*, July 24, 1886.

ADAMÜCK (521) calls attention to the fact that not every unevenness of the conjunctiva must be called trachoma. He proposes the term "folliculosis conjunctivæ" for the cases of follicular swelling, which is found especially in young scrofulous persons in the temporal portion of the lower fornix, generally does

not affect the cornea, and may disappear of its own accord; it must be strictly kept apart from trachoma, into which it can only develop by specific infection. The only prophylactic against trachoma consists in strictly avoiding every possibility of infection. Large barracks are of no avail. The author prefers sulphate of copper to all other remedies, but it must be used carefully. Sanitary stations for trachoma patients are of benefit only when they are not less that 1,500 or 2,000 feet above the sea level.
HIRSCHMANN.

ANDREWS' (522) paper treats of trachoma and blennorrhœa neonatorum, and especially of the remedies and prophylactic measures. BURNETT.

J. DE CHRISTMAS-DIRCKINCK-HOLMFELD (523) comes to the same conclusions from his experiments as Venneman and Bruylants, that the jequirity-ophthalmia is not an infectious disease, but is due to the chemical action of jequiritin. He did not find any bacilli either in the pus or in the inflamed tissues, nor could any be cultivated. No transmission of the conjunctivitis from one eye to another through the secretion was observed, The most active jequirity-ophthalmia is produced by macerating the pulverized beans in glycerine. Subcutaneous injection of the ordinary as well as of a sterilized maceration produced in warm-blooded animals inflammation of the subcutaneous tissue, of the serous membranes, and even death. Neither the blood nor the products of inflammation of the poisoned animals possessed any infectious properties. v. MITTELSTÄDT.

DICKINSON (524) reports a case of pemphigus conjunctivæ, which, however, disappeared before the final issue of the disease. The blebs first made their appearance in the integument of the lids, later on the conjunctiva near the cornea. BURNETT.

FANO (525) removed a polypus 1 *cm* long from the plica semilunaris. The microscopical examination revealed some pigment cells in the tissue, and a small quantity of cartilaginous tissue in the centre of the tumor. MARCKWORT.

FONTAN (526) reports two more cases of tuberculosis of the conjunctiva and cornea. He also discusses at length the literature of the subject. According to Fontan, the best local treatment consists in scraping out the nodules and dusting iodoform plentifully upon them. When the tuberculosis is confined to the conjunctiva and cornea, the eye should not be sacrificed.
MARCKWORT.

FRYER (527) uses water from 140° F. up to near the boiling point, appplied as fomentations, in all forms of purulent ophthalmia and in corneal abscess and ulcers. BURNETT.

GRASSELLI (528) breaks one lance more for jequirity, and recommends it in the second stage of trachoma, *i. e.*, neither in the acute stage nor in the atrophic condition of the conjunctiva. Jequirity is contra-indicated when there is no pannus or when there are corneal ulcers. DANTONE.

KAZAUROW (529) concludes from sixty observations on healthy (five cases) and diseased eyes, that iodol cannot be awarded a prominent place in ophthalmology. The healthy eye is greatly irritated by the insufflation of iodol. Catarrhal affections are made very much worse. For phlyctenulæ, however, it is not inferior to calomel, and can, therefore, be used when the latter is contra-indicated (when iodine preparations are given internally). The author saw granular trachoma entirely disappear in one or two months after insufflations of iodol. HIRSCHMANN.

MINOR (530) relates the histories of five cases in which he had used boric acid powder with great success. The fine powder is dusted over the surface at intervals varying from three times a day to three times a week. BURNETT.

MITTENDORF (531) discusses the affections of the conjunctiva. He first treats of catarrhal conjunctivitis, the cause of which lies in atmospheric conditions, in overtaxing the eyes, in the abuse of alcohol, in impure air, in dust, smoke, snow, great heat, in men working at a fire, in the rapid evaporation of the moisture of the eye, in lessened power of resistance of the body, in older people, etc. The second group includes contagious conjunctivitis, blennorrhœa neonatorum, gonorrhoic ophthalmia, and trachoma; the last named can be transmitted not only directly, but also through flies, eye-glasses, etc. In the last section he discusses atropine-conjunctivitis.

In granular trachoma SCHTSCHEPKIN (532) injects two or three drops of a 2 % solution of carbolic acid with a Pravaz syringe into the subconjunctival tissue. He claims that after two or three such injections the granules disappeared in every case. He never saw any unpleasant consequences. He has thus far treated seven cases in this manner. HIRSCHMANN.

SMITH (533) made the transplantation after the manner of Wolfe, of Glasgow, and was successful. In one other case it was not successful. BURNETT.

WEEKS (534) reviews the literature of the subject very thoroughly, and gives some illustrative cases from practice. The summing up is as follows: Ophthalmia neonatorum is one of the most productive causes of blindness. By far the majority and all the severer forms of oph. neonat. are due to the presence of the gonococcus. This disease is contracted during or shortly after the birth of the child. Proper prophylactic measures may prevent its occurrence. Ophthalmia neonatorum and gonorrhœal conjunctivitis in the adult are very variable in the degree of severity. Both forms of the disease may be controlled in any of their stages by proper treatment. BURNETT.

535. CHAUCEL. De l'emploi de l'ésérine dans les maladies des yeux, en particulier de la kératite ulcéreuse. Thèse de Montpellier, 1886.

536. GALEZOWSKI. De l'emploi du thermo-cautère dans la chirurgic oculaire. *Rec. d'ophth.*, 1886, No. 12, p. 720.

537. GRANDMONT, GILLET DE. Traitement de la keratite infectieuse on des moissoneurs par les lavages frequents avec une solution de sublimé 1:2,000. *Rec. d'ophth.*, 1886, No. 11, p. 671.

GALEZOWSKI (536) recommends the thermo-cautery in trichiasis and entropium, in serpent ulcers, malignant tumors of the cornea, and in tumors of the sclera. He is utterly opposed to enucleation in malignant tumors of the cornea and sclera; he removes them with the knife and finishes the operation with the thermo-cautery. He reports two clinical histories, but fails to mention the vision. In neither case (1½ and 1 year respectively after the operation) was there any relapse. MARCKWORT.

GILLET DE GRANDMONT (537) recommends frequent bathing of the eye with sublimate in serpent ulcers. He first makes Saemisch's cut, washes out the anterior chamber with bromide of mercury 1:20,000 and then prescribes a bath of the eye in sublimate 1:2,000 every hour; after a while the number of baths and the strength of the solution are diminished (1:3,000). He is opposed to cauterizing the ulcers; the galvano-cautery is not mentioned. MARCKWORT.

538. TROITSKI. Free cyst in the anterior chamber. *Wjestnik ophth.*, 1886, No. 6, p. 474.

TROITSKI (538) observed in the left, otherwise perfectly healthy eye of a soldier, a freely movable, reddish-brown, oblong vesicle, 3 *mm* long, 2 *mm* broad, slightly translucent. It had remained unchanged for several years. The cyst was removed by operation; its contents did not seem to differ from the aqueous. Its walls consisted of fibrillar connective tissue interspersed with pigment and formations resembling leucocytes. The author thinks it analogous to the cysts described by Fucks (*Arch. f. Augenhk.*, vol. xv., No. 1). HIRSCHMANN.

539. FROTHINGHAM, G. E. Some cases illustrating the safety of cocaine as an anæsthetic in cataract-extractions. *Jour. Am. Med. Assoc.*, Aug. 21, 1886.

FROTHINGHAM (539) used cocaine in thirty-one cases. It failed to act as an anæsthetic in three cases. The author has not encountered any of the evil effects reported by some.

BURNETT.

Sections XI.–XX. Reviewed by DR. A. NIEDEN.

XI.—IRIS.

540. LAMBERG, TOR. Bidrag til anomalier hos iris. *Hygiea*, No. 10, p. 615. Stockholm, 1886.

541. LANDESBERG. Contributions to the knowledge of the congenital anomalies of the eye. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 407.

542. LANG. Congenital aniridia. *Trans. Ophth. Soc. Unit. Kingd.*, vol., x., p. 207.

LAMBERG (540) reports a case of anomaly of the iris, in which he observed at the pupillary margin of both eyes several small, blackish-brown, spongy tumors 1–1½ *mm* high which projected into the anterior chamber. He also has compiled the bibliography of similar cases thus far published. SCHJÖTZ.

LANDESBERG (541) describes a case of congenital heterochromia of the blue iris of a person twenty-three years of age. It was covered in its lower half with a streak of bright-black pigment like a coloboma, which extended in a vertical direction from the pupillary to the ciliary margin. Five years later this spot was occupied by a tumor, which proved to be a sarcoma.

LANG (542) observed in a case congenital aniridia of both eyes with lamellar cataract, which in the left was operated unsuccessfully. The patient had three children; the eldest had no defect, but the second and third had similar defects; the second died.

FITZGERALD.

XII.—CHOROID.

543. BRAILEY. Microscopical specimens showing an exceptional condition of the ciliary nerves. Cases of uveitis. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 98.

544. CHIBRET. Note sur un traitement simple de la panophthalmie. *Arch. d'ophth.*, vol. vi., No. 6, p. 545.

545. LANDESBERG, M. Contribution to the knowledge of the congenital anomalies of the eye. Two cases of congenital atrophy of the choroid and retina. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 408.

546. LAWFORD. Nævus of left side of face; nævus of choroid, subretinal hemorrhage, and detached retina in left eye. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v.. p. 136.

547. NETTLESHIP. Severe central choroiditis with almost perfect acuteness of vision; visual field defective at periphery. *Loc. eod.*, p. 147.

548. WAGENMANN, AUG. Contribution to the knowledge of iridocyclitis. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 4, p. 225.

BRAILEY (543) presented microscopical specimens showing an exceptional condition of the ciliary nerves in three cases of uveitis. In the first, the inflammation round the internal long ciliary artery extended into the contiguous portion of the corresponding long ciliary nerve; in the second the condition was the same, but less severe; in the third, that of an eye excised for intense irido-choroiditis, it was again severe. FITZGERALD.

CHIBRET (544) recommends the following method for shortening panophthalmitis, from observations of eight cases: broad incision of cornea with flap downward, opening of capsule, extraction of lens. As soon as the discharge of pus ceases, all the parts infiltrated with matter are removed with iris forceps and intra-ocular irrigation with a sublimate solution of 1:2,000. The two following days the irrigation is repeated when the bandage is changed, and on the third day the patient can be discharged.

V. MITTELSTÄDT.

LAWFORD (546) describes a case of nævus of the left side of the face, nævus of the choroid, subretinal hemorrhage, and detached retina in the left eye, in a child eight years old. It had visited the hospital two years ago as an out-patient, when note had been made that in the left eye there was a cataract, iris bulged forwards, and T increased. The mother had stated then that the eye had only recently failed. The child had received a blow on the eye some days before admission, complained of severe pain, and for the first time "a yellow color" was noticed in the eye. Slight ciliary injection, cornea clear, anterior chamber shallow, pupil dilated and irregular, lens opaque, yellow, $+ T_2$. On the left side of the face there was a large teleangiectatic nævus extending from the chin to the brow and including the lids. The conjunctiva of the globe was not affected. The microscopical examination of the enucleated globe, which had been hardened, and then cut with the freezing-microtome, plainly revealed the presence of a cavernous angioma of the choroid. FITZGERALD.

NETTLESHIP (547) describes a severe case of central choroiditis with almost perfect acuteness of vision, while the visual field was defective at the periphery. From the history it might be assumed that a large extravasation of blood took place, followed by partial absorption of the choroidal structures. FITZGERALD.

WAGENMANN (548) presents a study of the manifestations of local tuberculosis of the uveal tract. Of course the presence of bacilli and their power to transmit the disease must be shown. The author does not accept primary tuberculosis of the eye. He then adds a short clinical history and description of the microscopical appearance of his case, in which there was tuberculous iridocyclitis of the left eye of a man aged 44, who was probably also suffering from tuberculosis of the right testicle. Inoculation of a rabbit was followed by a well-marked tuberculosis, and bacilli were found in large numbers, while a pure culture of the pus from the anterior chamber was found to consist only of staphylococcus albus.

XIII.—GLAUCOMA.

549. DE BENEDETTI. Irideremia totale congenita. Ectopia lentis congenita con lussatione spontanea del cristallino e glaucoma consecutivo. *Ann. di ottalm.*, vol. xv., 2–3, p. 184.

550. CHISOLM, J. J. An acute attack of glaucoma induced by the local application of cocaine. *Amer. Jour. Ophth.*, 1886, No. 8, p. 229.

551. JACOBSON, J. Contribution to the knowledge of glaucoma. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 3, p. 96.

552. RAMPOLDI. Duocentoventotto osservazioni cliniche a contributo della etiologia del glaucoma. *Ann. di ottalm.*, vol. xv., 2–3.

Benedetti (549) describes at length the eyes of three brothers and sisters affected with congenital irideremia and ectopia of the lens, who were attacked with chronic glaucoma soon after the age of puberty. Repeated paracentesis of the cornea, sclerotomy, and in one the extraction of the cataractous lens brought only temporary improvement. A fourth brother had normal vision of both eyes, but the ophthalmoscope revealed a small coloboma of the sheath of the optic nerve. The father of the four patients had the same malformation in both eyes, but did not become blind until late in life. His eyes were examined anatomically.

Dantone.

In Chisolm's (550) patient there had been glaucoma in one eye, which was operated fifteen months ago. The cocaine was applied to the other to investigate the pain following the application of nitrate of silver for a conjunctival catarrh. In three-quarters of an hour glaucomatous symptoms supervened, which, however, were subdued by eserine and the artificial leech.

Burnett.

Jacobson (551) once more defends v. Graefe's definition of the nature of glaucoma, as consisting in an increase of the intraocular pressure combined with a disturbance of function of the retina and optic nerve (excavation and amblyopia), and expresses the desire uttered once before of coming to an understanding as to the clinical picture of glaucoma, now so polymorphous in conception. He then discusses the question whether the pressure hypothesis holds good also for glaucoma simplex, and concludes from extensive clinical observations that primary simple glaucoma is the result of a gradually diminishing velocity in the choroidal circulation, combined with the secretion of a liquid of the same optical value into the vitreous, thus causing the increase in pressure.

Rampoldi (552) presents detailed statistics of 228 cases of glaucoma, observed among 16,371 eye-patients in five years (1.39 %). He discusses the relations of the disease to sex (1.97 % in women, but only 0.87 % in men), to the age and social position of the patients, to the geographical position of their home, and to the season of the year when the affection began. Next he speaks of the form of glaucoma in its relation to the age and social position of the patient, with remarks on the ratio between bi- and monocular occurrence, and the causative or accompanying local ocular affections. Finally he mentions the connection between refraction and the color of the iris and glaucoma, between heredity and the disease, and its relation to gout and other constitutional affections. DANTONE.

XIV.—SYMPATHETIC OPHTHALMIA.

553. BRAILEY. On the condition of the ciliary nerves in certain conditions of the eye. *Trans. Ophth. Soc. Unit. Kingd.*, 1886, vol. v, p. 98.

554. BRAILEY. Microscopical specimens showing the condition of the ciliary nerves in case of sympathetic disease. *Loc. eod.*, vol. v., p. 99.

555. BRAILEY. Sympathetic disease of one week's standing, indicated by rigidity of the pupil, and a history of two attacks of swelling of the lid, with pains in and about the eye. *Loc. eod.*, p. 100.

BRAILEY (553) concludes, from an examination of 90 eyes primarily with a view of ascertaining whether structural changes of the ciliary nerves had any thing to do with the transmission of sympathetic disease, that inflammation of the ciliary nerves is not an essential factor in its production, and that inflammation *round* the ciliary nerves, though more often present in both exciting and sympathizing eye, is not an essential cause, since it is less marked than the inflammation round the accompanying artery. Inflammation round the long ciliary arteries, though more marked, more constant, and a shorter route, has however little to do with the transmission, for it may be wanting entirely and is as well seen in cases of panophthalmitis which is remarkably free from sympathetic disease. Inflammation of the sheaths of the arteries also occur in iritis serosa. FITZGERALD.

BRAILEY (554) found in his first case, in which the left eye had been excised for loss of sight in iritis, severe inflammation and pain, while the right had been operated upon for cataract eleven months previously, that the long ciliary nerves and arteries were perfectly normal. Also in the second case, in which the eye had been removed on account of sympathetic iridocyclitis.

FITZGERALD.

BRAILEY (555) reports a case of sympathetic disease of one week's standing, indicated by rigidity of the pupil, and a history of two attacks of swelling of the lid, with pain in and about the eye, in which the sympathizing eye recovered, after the local abstraction of blood, exclusion of light, and the use of mercury.

FITZGERALD.

XV.—LENS.

556. **Abadie.** Des procédés actuels d'extraction de la cataracte. *Ann. d'ocul.*, vol. xcvi., p. 257.

557. **Abadie.** Des enclavements iriens et capsulaires consécutifs à l'extraction de la cataracte avec iridectomie. *Ann. d'ocul.*, vol. xcvi., p. 128.

558. **Agnew, C. R.** The after-treatment in cataract and iridectomy operations. *N. Y. Med. Rec.*, July 24, 1886.

559. **Browne.** Zonular cataract and dental malformations. *Ophth. Rev.*, Oct., 1886, p. 277.

560. **Bucklin, C. A.** Report and remarks on a series of 200 cataract extractions. *N. Y. Med. Rec.*, Nov. 20, 1886.

561. **Chisolm, J. J.** A revolution complete in the after-treatment of cataract operations. *N. Y. Med. Rec.*, July 31, 1886.

562. **Fieuzal.** Cataractes hémorrhagiques et hémorrhagies divers consécutives aux opérations de cataracte. *Bull. clin. nat. opth.*, vol. iv., No. 4, Oct.–Dec., 1886, p. 145.

563. **Hotz, F. C.** The rational treatment of patients after cataract operations. *Amer. Jour. Ophth.*, Nov., 1886.

564. **Jacobson, J.** A well-sustained opinion on the merits of Daviel's flap-extraction and v. Graefe's linear extraction. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 3, p. 73.

565. **Knapp, H.** Cataract extraction without iridectomy. *Trans. Amer. Ophth. Soc.*, 1886.

566. **Lange, O.** Subsequent remarks on a case of spontaneous clearing up of a cataractous lens. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 4, p. 281.

567. **Lawrentjew.** Report on 200 cataract extractions performed in country practice. *Wjestnik Ophth.*, Nov.–Dec., 1886.

568. **Nettleship.** Spontaneous disappearance of diabetic cataract. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 107.

569. **Power.** Case of black cataract. *Loc. eod.*, p. 111.

570. **Reynolds, D. S.** Dressing after extraction of cataract. *Progress*, Aug., 1886.

571. **Story.** Zonular cataract and dental malformations. *Ophth. Rev.*, Oct., 1886, p. 277.

572. **Strawbridge, Geo.** Report of 261 cases of cataract extraction. *Trans. Amer. Ophth. Soc.*, 1886.

573. Webster, D. Report of 50 cases of cataract extraction, with remarks. *Trans. Amer. Ophth. Soc.*, 1886.

Abadie (556), like many other French oculists at present, recommends Daviel's flap-extraction. According to him, linear extraction with iridectomy was justly preferred for a time; but since the introduction of antiseptics, eserine, and cocaine, Daviel's method should have the preference. For immature cataracts, and those with posterior synechiæ, Abadie recommends iridectomy. While Wecker, Galezowski, and others still use Graefe's knife, Abadie advocates the re-introduction of a modified Richter's or Beers' knife. Marckwort.

Abadie (557) discusses the incarceration of the iris and lens-capsule following the extraction of cataract. In both cases operative procedures must be adopted if the symptoms of irritation do not soon disappear. In incarceration of the iris, the incarcerated iris is excised, thus somewhat enlarging the artificial coloboma. When a small prolapse occupies one of the angles, an attempt may be made to destroy it with the galvano-cautery. In incarceration of the capsule, Abadie recommends a peculiar method, based on the fact that not the central but the peripheral part of the capsule is incarcerated, that a strain therefore exists between the equator of the capsule and the wound. To cut this part of the capsule, Abadie performs a broad sclerotomy ½ *mm* behind the section made for extraction. In conclusion he recommends extraction without iridectomy, iridectomy being necessary only in complicated cataracts. Marckwort.

Agnew (558) claims that for more than twenty years he has taught the doctrine of the value of light in the wards of an ophthalmic hospital. Burnett.

Browne's (559) experience teaches him that when zonular cataract is found with a history of fits, the teeth will certainly be malformed; and when zonular cataract occurs independently of fits, the teeth will probably be good. He notes 7 cases, 5 the subjects of fits and exhibiting malformed teeth, 2 with no history of fits and teeth uninjured. To the characteristic teeth met with in these cases, and which have a rude resemblance to rocks fretted by the intermitting action of the waves, he gives the name of "tidal-mark teeth." Fitzgerald.

Bucklin (560) operated only 100 of the 200 extractions reported. Of these 96 could read the daily papers, 2 were failures, and in 2 there was disease behind the cataract, which prevented good vision. The author does not favor cocaine employment in the operation, but uses profound ether anæsthesia. All were done with an iridectomy. BURNETT.

In this second paper CHISOLM (561) records his further trial of the so-called "new method" of discarding bandages and dark rooms in the after-treatment of cataract and other eye-operations. His more extended experience justifies his formerly expressed satisfaction with the method. BURNETT.

FIEUZAL (562) reports several cases of hemorrhage after extraction. In one eye, which had been affected with irido-choroiditis and increased pressure, but had good perception of light, so severe a hemorrhage immediately followed the extraction, that Fieuzal performed exenteration. V. MITTELSTÄDT.

HOTZ (563) condemns dark rooms and forced confinement to bed after cataract operations, frequently allowing patients to sit up and walk about the day of the operation, but he is not disposed to substitute strips of plaster for the bandage. BURNETT.

JACOBSON (564) presents a short critical review on the relative value of Daviel's flap and v. Graefe's linear extraction. He adds two clinical histories of two unsuccessful cases, in which the direct cause of infection of the wound could not be discovered.

KNAPP (565) reports six cases of extraction without iridectomy. In none of these was there incarceration of the iris in the wound, but in three there were posterior synechiæ. Three made ideal recoveries. The chief advantage of the method, to the author's mind, is the perfect freedom of the corneal section from portions of the lens-capsule and iris. BURNETT.

LANGE (566) reports the final result of his observation of the spontaneous clearing up of a cataractous lens, which he published in 1884 (*cfr*. rev., No. 1,112, vol. xv., these ARCH., Ger. ed.). Nothing but a small remnant of the nucleus enclosed in the capsule remained, which he ascribes to absorption of the liquefied and gradually clearing up corticalis.

Three fourths of the extractions performed by LAWRENTJEW (567) were done according to v. Graefe's method. In one fourth he made a less peripheric section and a small iridectomy (sphincterectomy). Eight were failures. Strict antiseptic measures were adopted. The bandage was not changed until the sixth day, if the patient did not complain. HIRSCHMANN.

NETTLESHIP (568) publishes some further notes, furnished by Dr. Tannahill, who reported the case originally in the *Brit. Med.*

Journ. of Jan. 31, 1885. The patient came under observation in 1883. Both lenses were cataractous (symmetrical nuclear cataract) and the vision so defective that the patient could not recognize people or large objects, and could not read ordinary print. Under appropriate treatment his lenses gradually cleared, and the sight so improved that he was able to read very small print with the naked eye. FITZGERALD.

REYNOLDS (570) has long since abandoned bandages in the after-treatment of cataract extraction. He uses a pad of absorbent cotton, held in place by strips of adhesive plaster from the brow to the cheek. BURNETT.

STORY (571) records nine cases of zonular cataract, in five of which the "rhachitic" teeth, as Horner terms them, were present. He considers that there is such a close similarity between lenses and the dental enamel in their origin and development, that it is natural to expect that they will be affected by the same pathological agent. FITZGERALD.

STRAWBRIDGE (572) employed an incision which was a compromise between the Graefe and the corneal flap incisions. In all an iridectomy was made. In about one third an antiseptic dressing of boracic acid was used, but the author does not attach much importance to its use. Cocaine was used in 48 cases, with no evil results attributable to the agent. Successes, 85 %; partial successes, 8.1 %; failures, 6.7 %. BURNETT.

WEBSTER (573) approves of double extractions in judiciously selected cases. The Graefe method was used in all. Successes, 41, or 82 %; partial successes, 6, or 12 %; failures, 3, or 6 %. All eyes were operated on with aseptic precautions. BURNETT.

XVI.—VITREOUS.

574. PROUT, J. S. An anomalous formation in the vitreous humor of each eye. *Trans. Amer. Ophth. Soc.*, 1886.

PROUT (574) supposed the formation to be congenital, since both eyes were affected in nearly the same manner, and that the bodies were the remains of the fœtal circulation. The formation consisted of a narrow band, which had its origin on the temporal side of the disc, bending over that region upward and downward, about 3 or 4 disc diameters from the optic-nerve entrance laterally, and being about 12 disc diameters in length. It arched forward, the two extremities being near two atrophic spots in the choroid. The eyes were myopic and astigmatic; $V = \frac{18}{50}$. BURNETT.

XVII.—RETINA AND FUNCTIONAL DISTURBANCES.

575. Bull, C. S. Analysis of 103 cases of exudative neuro-retinitis associated with chronic Bright's disease. *Trans. Amer. Ophth. Soc.*, 1886.

576. Derby, H. On the possible retardation of retinitis pigmentosa. *Trans. Amer. Ophth. Soc.*, 1886.

577. v. Duyse. Un nouveau cas de "colobome" centrale ou musculaire. *Ann. d'ocul.*, vol. xcvi., p. 139, and *Ann. de la Soc. de Méd. de Gand*, 1886.

578. Eales. A case of supposed unilateral albuminuric retinitis. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 126.

579. Eaton, F. B. The treatment of detachment of the retina without operation, with a case. *Amer. Journ. Ophth.*, Aug., 1886.

580. Fano. Valeur de l'iridectomie dans le traitement du décollement de la rétine. *Journ. d'ocul. et de chir.*, Oct., 1886, p. 211.

581. Harlan, G. C. Thrombosis and perivasculitis of the retinal blood-vessels. *Trans. Amer. Ophth. Soc.*, 1886.

582. Hartridge, G. On tobacco amblyopia. *Brit. Med. Journ.*, Jan. 30, 1886.

583. Holt, Eugene. Treatment of detachment of the retina. *Amer. Journ. Ophth.*, Nov., 1886.

584. Millikin, B. L. Case of left lateral homonymous hemianopsia. *Amer. Journ. Ophth.*, Oct., 1886.

585. Nettleship. Visual function retained by a retina, which has almost certainly been detached for several years. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 133.

586. Risley, S. D. Albuminuria of pregnancy. Retinitis. Induced premature delivery. *Trans. Amer. Ophth. Soc.*, 1886.

587. Trousseau, A. Les rétinites urémiques. *Bull. de la clin. nat. de l'hôp. des quinze-vingts*, vol. iv., No. 4, Oct.–Dec., 1886, p. 173.

588. Waitzfelder, E. A case of bitemporal hemianopsia. *N. Y. Med. Rec.*, Nov. 20, 1886.

In 56 cases of Bull (575) the duration of the renal disease was unknown. In 47 it was varied from 6 months to several years. The two sexes were affected about equally. The ages varied from 5 to 78 years. V ranged from $\frac{20}{20}$ to zero. In all both eyes were affected sooner or later. The retina alone was affected in 80 cases, both optic nerve and retina in 25 per cent. of the cases. Hemorrhage in both eyes was noted in 46 cases, in the right eye alone in 11; in the left alone in 12; in 34 there were none. There was hypertrophy of the left side of the heart without valvular disease in 79 cases; with valvular disease, 16. Cardiac disease developed while the patient was under observation in 5 cases. Of the 86 who died, 57 died in the first year; 18 within the second; 6 within the third; 4 within the fourth, and 1 within the sixth. BURNETT.

H. DERBY (576) relates two cases of retinitis pigmentosa, in which the visual fields were enlarged by the use of the constant current three times a week for three months. Vision was but little improved. The notes of another case of Dr. Standish are given, in which both field and vision were improved by the same means. BURNETT.

VAN DUYSE (577) publishes another case of central "coloboma." In discussing these so-called "colobomas," Van Duyse contends that these cases must not be considered true colobomas, as the choroid and retina are not absent over these spots, but have undergone a pathological change (fœtal choroiditis). MARCKWORT.

EALES' (578) case exhibited diffuse and destructive retinitis of the albuminuric type in one eye only, and for a period of nearly four months, during which time the patient suffered from albuminuria. He had been a heavy drinker, and had met with a severe fall, which had wrenched and injured his left side and loins. The vision in the affected eye was observed to be defective the following morning. Eales alludes to a case reported by Yvert, who quotes five cases published by Potain, in which there was anasarca of one side, or at least more marked on one side, in consequence of a contusion of one kidney. In explanation of this Potain considers an abnormal action of the sympathetic nerve of one side of great importance. FITZGERALD.

EATON (579) gives the history of a case of detachment of the retina, with drawings of the visual field, which was treated successfully by diaphoresis, pilocarpine, and Turkish baths. BURNETT.

FANO (580) reports three cases of detachment of the retina, in which he performed iridectomy; in none of them was there any improvement after the operation. According to Fano, iridectomy in detachment of the retina must be regarded as antiphlogistic treatment of the causative choroiditis. If the choroiditis is favorably influenced by the operation, the subretinal exudation may disappear and the retina resume its normal position ; but if the choroiditis is not affected thereby, no improvement as regards the detachment can be expected. MARCKWORT.

HARLAN'S (581) patient was a married woman 33 years of age. She had a miscarriage in Jan., 1886. In May, 1886 she noticed suddenly a dimness of vision in the left eye, and in 24 hours there was no perception of light in this eye. No uterine, kidney, or heart trouble. The ophthalmoscope showed all the retinal blood-vessels completely transformed into white bands, in none was there any blood whatever. There was a small artery filled with blood running from near the centre of the disc upward. There were remains of hemorrhages in the retina. There were also some retinal hemorrhages in the other eye. The picture of another retina was shown in which some of the vessels were undergoing the same change. The author is inclined to consider the condition due to perivasculitis. BURNETT.

HARTRIDGE (582) gives an analysis of 20 consecutive cases of tobacco amblyopia. In all the vision was improved, and in 13 recovery took place. Treatment consisted mainly in the total discontinuance of smoking. Half the cases got strychnia and the other half a placebo, with apparently equal results. Galvanism was used in three cases with no appreciable effect. MAXWELL.

HOLT (583) reports that he has twice successfully treated detachment of the retina by confinement (not recumbent) and bandaging, atropine and hypodermic injections of pilocarpine.

BURNETT.

MILLIKIN'S (584) patient, a man of 40, became unconscious and delirious, often vomiting and purging, and remained so for 10 days. No paralysis. Left hemianopsia. BURNETT.

In NETTLESHIP'S (585) case there was universal detachment of the retina from the edge of the disc as far as could be seen. The greater part of the retina remained fairly, if not quite transparent. With various glasses from + 8 to + 18 D fingers could be counted at 1' and letters in 20 J and a few in 18 J could be made out. FITZGERALD.

In RISLEY'S (586) case pregnancy had advanced to about the fifth month. Typical retinitis Brightii. The induction of premature labor put a stop to the progress of the albuminuric symptoms, and the retinitis subsided with no essential impairment of vision. BURNETT.

TROUSSEAU (587) observed several cases of retinitis albuminurica, in which repeated tests failed to show the presence of albumen in the urine; the albumen, like the œdema, not appearing until later. v. MITTELSTÄDT.

WAITZFELDER'S (588) patient was a man 18 years of age. No history of syphilis. In addition to the temporal hemianopsia there was slight neuroretinitis leading to atrophy. The antemortem diagnosis is a tumor, probably a sarcoma, anterior to the chiasma and pressing on the internal fasciculi of both optic nerves. BURNETT.

XVIII.—OPTIC NERVE.

589. ALT, A. One hundred and twenty cases of anæmic and atrophic condition of the optic nerve and retina. *Amer. Journ. Opth.*, Aug. and Sept., 1886.

590. RAMPOLDI. Atrofia ottica susseguita a blefarite gangrenosa. *Ann. di ottalm.*, vol. xv., 2–3, p. 113.

ALT'S (589) cases are tabulated in full, of which we can give only an abstract. There are 95 men and 25 women. In 19 the cause was central (cerebral or spinal). In 51 cases the cause was alcohol and tobacco, alone or combined. Of these there were 7 in which tobacco seemed to be the sole cause, and 3 in which it was attributed to alcohol alone. BURNETT.

RAMPOLDI (590) observed in a lady, aged 40, left-sided complete amaurosis from acute atrophy of the optic nerve, which had developed within a month from gangrenous erysipelas of the upper lid of the same eye. DANTONE.

XIX.—INJURIES (FOREIGN BODIES) AND PARASITES.

591. v. HIPPEL, A. Injuries of the eye with dynamite. *v. Graefe's Arch. f. Ophth.*, vol. xxxiii., 3, p. 205.

592. KNIES, M. Case of injury to the eye by lightning. *v Graefe's Arch. f. Ophth.*, vol. xxxii., 3, p. 236.

593. MURRELL, T. E. A remarkable case of foreign body carried ten years in the eye. *Journ. Amer. Med. Assoc.*, Oct. 23, 1886.

594. RANDALL, B. A. A case of subluxation of the lens

with double rupture of the choroid ; recovery with good vision. *Trans. Amer. Ophth. Soc.*, 1886.

595. Snell, S. A. A case of iron splinter on the anterior capsule of the lens. *Brit. Med. Journ.*, Nov. 13, 1886.

596. Webster, D. A case in which vision was totally obliterated by a gun-cap in the eye. *N. Y. Med. Rec.*, July 24, 1886.

597. Webster, D. Removal of a piece of steel from the crystalline lens. *Amer. Journ. Ophth.*, Aug., 1886.

Hippel (591) saw among 3.471 patients 554 cases of severe injury = about 16 %, 20 of which were produced by dynamite (in 17 cases both eyes and in 3 only one). The final condition was so unfavorable that no other affection of the eye can be compared with it, as of the 20 persons injured 8 became totally blind in both and 7 in one eye, and only 2 were able to resume their occupation as miners. The entrance of chemically injurious substances (nitro-glycerine and silicious marl) explains the poor prognosis which must be made in perforating wounds due to dynamite.

Knies (592) observed in a boy aged ten, who had been struck by lightning, direct combustion of the skin of the face, singeing of the eyelashes, conjunctivitis and keratitis of both eyes, paralysis of both levatores, and incomplete ptosis, which disappeared in four weeks. In the right eye there was also ribbon-shaped cataract and large stellate posterior polar cataract, while in the left broad cataractous bands were just beginning to form. The latter condition, as well as the amaurosis of the right eye, disappeared spontaneously ; the cataract of this eye was extracted ; the lens-capsule was much thickened.

Murrell (593) enucleated an eye which had been injured ten years previously by the explosion of a glass retort, destroying sight. After the first inflammation had subsided there was no inconvenience felt in that or the fellow eye. The eye, however, was taken out, and a piece of glass found encysted in the vitreous in a plane parallel to the iris. It was 15 *mm* long, 12 *mm* wide, and 1½ *mm* thick. Burnett.

In Randall's (594) case, one of the ruptures was in the usual place, near the macula, the other quite unusual, just at the inner lower edge of the disc. There was also a large area of pigmentation of the choroid on the temporal side of the disc. Two excellent chromo-lithographs accompany the paper. Burnett.

Snell (595) describes a case where an iron splinter was embedded in the anterior capsule of the lens. After holding the electro-magnet for some time in contact with the cornea, the piece of iron sprang forward and was then guided to the periphery and removed through a small incision. Maxwell.

In Webster's (596) case, the gun-cap was found, after enucleation of the eyeball, embedded in the retina at the entrance of the optic nerve in such a manner as to cut off all communication between the retina and nerve. Burnett.

Webster (597) reports a case in which the foreign body had passed through the iris and penetrated the lens, projecting about a line into the anterior chamber. No attempt was made to introduce a magnet, but the steel with its capsule of lymph and a part of the iris was removed with forceps. At time of discharge $V = \frac{20}{200}$.

Burnett.

XX.—OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

598. Bull, C. S. A consideration of some unusual forms of intraocular hemorrhage, with special reference to etiology and prognosis. *N. Y. Med. Rec.*, Dec. 4, 1886.

599. Borel, G. Afféctions hystériques des muscles oculaires (clinique du Dr. Landolt). *Arch. d'ophth.*, vol. vi., No. 6, 1886, p. 481.

600. Carl Theodor, Duke in Bavaria. Contribution to the pathological anatomy of the eye in kidney diseases. With 12 plates. Wiesbaden, Bergmann, 1887, 77 pp.

601. Carter, Brudenell. A case of amblyopia, caused by malaria fever. *Brit. Med. Journ.*, Jan. 30, 1886.

602. Edmunds and Lawford. Further observations on the condition of the optic nerves in intracranial disease. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 102.

603. Féré. Notes pour servir à l'histoire de l'amblyopie hystérique, exercise de la sensibilité. *Rec. d'ophth.*, 1886, No. 10, p. 606.

604. Frost. Case of conjugate deviation of the eyes down and to the right. *Trans. Ophth. Soc. Unit. King.*, vol. v., p. 197.

605. Gruening, E. Case of tumor of the left occipital lobe, with right homonymous hemianopsia (with autopsy). *Trans. Amer. Ophth. Soc.*, 1886.

606. Gunn. Symmetrical enlargement of upper part of face,

with double proptosis and optic atrophy, complete anosmia and paralysis of left portio dura. *Trans. Opth. Soc. Unit. King.*, vol. v., p. 180.

607. JACKSON, EDW. The relation of eye-strain to headache. *Trans. Penn. State. Med. Soc.*, 1886.

608. JEAFFRESON, C. S. On so-called "lead-neuritis." *Brit. Med. Journ.*, Feb. 27, 1886.

609. LICHTWITZ, L. Des zones hystérogènes observées sur la muqueuse des voies aériennes supérieures, des organes de sens, et en particulier de l'œil et de l'appareil lacrymo-nasal. *Rev. clin. d'ocul.*, vii., No. 11, Nov., 249 pp.

610. NETTLESHIP. Purulent iridocyclitis. *Trans. Ophth. Soc.*, vol. v., p. 102.

611. PANAS. Amaurose double déterminée par une méningite chronique de la base du cerveau. *Rec. d'ophth.*, Nov., 1886, p. 651.

612. PASTERNATZKY, F. On the unequal width of the pupil in internal diseases (from the clinic for diagnosis and general therapeutics of Prof. Tschudnowsky). Preliminary notice. *Wratsch*, 1886, Nos. 49 and 51.

613. RAMPOLDI. Osservazione di neurite ottica coincidente con morbo di Aran. *Ann. di ottalm.*, vol. xv., 2–3, p. 116.

614. RAMPOLDI. Sui rapporti morbosi che sono tra l'apparato circulativo e il visivo. *Ann. di ottalm.*, vol. xv., 2–3, p. 171.

615. RAMPOLDI. Guarigioni inesplicabili del panno corneale. *Ann. di ottalm.*, vol. xv., 2–3, p. 112.

616. SCHLEICH. The eyes of the epileptics at the Institute Schloss Stetten in Wuerttemberg. *Zeh. klin. Monatsbl.*, vol. xxiv., p. 469.

617. SNELL. Recurrent paralysis of third nerve in association with migraine. *Trans. Ophth. Soc. Unit. Kingd.*, vol. v., p. 193.

618. UHTHOFF, W. Investigations on the influence of chronic alcoholism on the human eye. *v. Graefe's Arch. f. Ophth.*, vol. xxxiii., 4, p. 95, and vol. xxxiv., 1.

619. WICK, D. M., and ALT, A. A case of rapidly growing tumor of the brain; atrophy of both optic nerves without neuritis. *Am. Jour. Ophth.*, Nov., 1886.

BULL (598) gives the history of 17 cases in which there seemed to be some connection between the intraocular hemorrhage and severe malarial poisoning. The hemorrhages, the author thinks, were in the main due to rupture of the choroidal or ciliary vessels or possibly the vessels of the optic nerve sheath during the febrile or congestive period of the attack. They very seldom entirely disappear. He has had no good effect from jaborandi or pilocarpine or the electric current. He depends altogether on building up the general system. BURNETT.

In the introduction to his paper BOREL (599) points out the close connection between the hysterical and so-called reflex disturbances of the ocular muscles. He believes that a large part of the latter are due to hysteria, which frequently can only be recognized with great difficulty as the cause, but which often gives rise to reflex symptoms. Borel also discusses the influence of hypnotism in its various phases—somnambulism, catalepsy, lethargy—and of hystero-epilepsy on the movements of the eye. He mentions the wide open, staring state of the palpebral fissure in the cataleptic condition, which can be changed to the lethargic by closing the eye. In the latter condition the eye is generally closed, though in both the reverse sometimes occurs. Genuine cataleptic manifestations on the part of the ocular muscles, however, have been observed. There may also be convulsive contractions of individual muscles, conjugate deviation, blepharospasm, while hystero-epileptic attacks may be preceded by spasms of individual muscles and of the lids, and by disturbances of accommodation. The author then discusses the individual muscular disturbances: spasms and paralysis due to hysteria. Among the former blepharospasm is the most common. The various forms are discussed at length.

MITTELSTÄDT.

The DUKE CARL THEODOR (600) bases his paper on the pathological anatomy of the eye in kidney diseases on the examination of 15 eyes, a relatively large number, which enabled him to present the pathological changes in the individual membranes not only in the early and middle stages, but also in the advanced stage of the disease. A gap in our knowledge of the various phases is thereby filled out. The principal typical condition in the early stages is an arteriitic process more or less marked in all the blood-vessels of the eye. The main changes are therefore found in the choroid, as the products of inflammation are observable not only in the stratum of the blood-vessels, but also diffusely spread through the membrane itself, while the degenerative changes are principally localized in the papilla and retina. The predilection of the disease for these two membranes may be due (1) to the existence of a closed system of capillaries in the choroid, and (2) to the fact that the retinal blood-vessels are in a certain sense terminal arteries. The author comes to the conclusion that the arteriitic process begins in the outer layer of blood-vessels. Twelve excellent plates illustrate the microscopic conditions.

BRUDENELL CARTER (601) reported a case of high degree of amblyopia after malaria to the Clinical Society of London. The patient was a man aged 35, whose V had sunken to quantitative perception of light. Sublimate and iodine were given internally, and strychnine was injected, whereupon V again became normal, and J. No. 1 was read, although the sheath of the optic nerve remained pale ; the blood-vessels were fuller.

EDMUNDS and LAWFORD'S (602) communications have reference to the authors' former communication published in the third volume of the Transactions. The conclusion they arrived at was that the optic neuritis in intracranial disease is due to the direct propagation of inflammation from the meninges at the base of the brain to the meninges of the optic nerve and to the nerve itself. On the present occasion they report 13 cases, and taken as a whole they consider them confirmatory of the conclusions arrived at previously. FITZGERALD.

FROST'S (604) patient, æt. 25, gave history rather unsatisfactorily, but stated that three years ago he had suddenly fallen down unconscious and remained so for twenty minutes, had vomited on the following day, and on the third day had again become unconscious and remained so for eight or ten days ; he then found that the right leg dragged. The foot is everted and dragged in walking. Both eyes are deviated downwards and to the right. The left appears on a lower level than the right. The eyelids droop. The eyes cannot be moved, except farther downward and to the right. If one eye is covered the other can generally follow the finger in all directions. The left more frequently fails in this than the right. O. D.V = $\frac{20}{20}$, O. S. V = $\frac{20}{30}$. Fundus of both normal. FITZGERALD.

GRUENING'S (605) patient was a man 55 years of age. He had severe headaches, but no other important nervous symptoms. Typical right homonymous hemianopsia, and choked disc. The entire left occipital lobe was occupied by a tumor, which, on microscopic examination, proved to be a spindle-cell sarcoma.

BURNETT.

The case reported by GUNN (606) was that of a woman æt. 22, married, who attended at Moorfields Eye Hospital in June, 1885. Health had been good up to the age of 16. For nine months preceding onset of catamenia she had suffered almost daily from severe neuralgia in temples, her face had also swollen and sense of smell practically lost. No further ailment till she became pregnant, when she suffered from frequent vomiting for about three months. Some time later began to suffer from severe neuralgic pain in both temples,—worse in left. Two months before her confinement sight of left eye began to get dim, and two days before the birth of the child she became quite blind in this eye—which continued for one month—then the vision gradually improved, but again she became suddenly blind in the eye. The day after the baby's birth sight went "altogether" in the right, and continued so for a fortnight. Then it began steadily to improve. When V began first to fail she noticed that her face was slightly swollen and the eyeballs prominent. When seen at the hospital there was some thickening and marked tenderness over the whole of both superior maxillary bones, and over the ramus of the jaw on both sides. Subsequently paralysis of left portio dura showed itself, and sight gradually became worse, and the last note states there was no perception of light in either eye.

FITZGERALD.

JACKSON (607) relates several cases of eye-headache, in which the proper glasses gave relief. The author thinks the headaches from eye-strain are of double parentage, one parent being the strain on the eye muscles, the other the impaired nutrition of the nerve-centres, and that both should be looked after.

BURNETT.

JEAFFRESON (608) doubts the existence of a primary disease of the optic nerve or retina due to lead. He thinks most of the cases are secondary to kidney disease coused by lead, others are the result of sudden effusion into the ventricles or subarachnoid space in the brain, while a proportion are due in women to suppression of the menses, which often happens in lead-poisoning.

MAXWELL.

LICHTWITZ (609) reports the case of an hysterical woman, aged 29, who had suffered for two years with cramps, right-sided gonalgia and hemianæsthesia, and who presented many hysterogenic zones, by touching which cramps, cataleptic and lethargic conditions could be produced. The principal surfaces were those of the nasal cavity, of the posterior aspect of the velum palati, the outer ear canal, and the membrana tympani. The spasmogenic zones did not disappear when cocaine was injected into the nose. The conjunctiva of the right eye is not sensitive to touch, the cornea of that eye is slightly sensitive, in the left eye also the sensibility is reduced, with the exception of the cornea. When these parts in the right eye are rubbed with a probe or with the lids, a cataleptic condition is produced ; when the same is done in the left eye, the patient falls into a lethargic sleep. The former condition can also be changed to the latter in this manner. The result is similar when a probe is introduced into a lachrymal canal. Probing the naso-lachrymal canal produces cramps. The hysterogenic zone of the conjunctiva disappears when cocaine is used. The author excludes simulation. In other patients with hysterogenic zones of the respiratory passages, there were none in the eye. The naso-lachrymal canal was not examined.

v. MITTELSTÄDT.

In cases of destructive ophthalmitis in young children, simulating glioma, NETTLESHIP (610) has already directed attention to the frequency with which such eye attacks coincided with severe general illness, often accompanied by cerebral and sometimes pyaemic symptoms. The case now reported was watched from the beginning, and was that of a child who died of cerebro-spinal meningitis, probably due to purulent otitis. Nettleship points out the probability that the eye-disease and meningitis were pyæmic. If pseudo-glioma is the result of suppurative phlebitis, we must assume that recovery from pyæmia is comparatively common in very early life.

FITZGERALD.

PASTERNATZKY (612) generally found unequal width of the pupils in those constitutional diseases in which there is a distinct anatomical lesion, generally on one side only (croupous pneumonia, pleuritis, renal colic, affections of the heart and liver). The various diseases may be ranged as follows, as regards the frequency of occurrence of this symptom:

In croupous pneumonia, inequality of the pupils occurs in	85 %	of all cases.
In heart-disease and aneurysm of the aorta .	61	" " "
In pleurisy	52	" " "
In catarrhal chronic pneumonia . . .	38	" " "
In acute rheumatism of the joints . .	25	" " "
In catarrh of the respiratory passages . .	25	" " "

In scurvy	16 %	of all cases.
In typhus fever	16	" " "
In febris recurrens	15	" " "
In typhoid fever	13	" " "

In croupous pneumonia the pupil of the affected side is larger in the beginning of the process; the maximum of dilatation is reached at the height of the disease. Shortly before the crisis, and during the latter, the pupils become equally wide, while during convalescence the pupil of the affected side becomes smaller. The author believes that the inequality of the pupils in internal diseases is a reflex phenomenon in close connection with the process of disease, the nature of which has not yet been determined. Hirschmann.

Rampoldi (613) has twice observed neuro-retinitis in persons who were suffering from progressive atrophy of the muscles of the shoulder. He asks whether both diseases may not be due to the same cerebral process. Dantone.

Rampoldi (614) reports several cases of eye-disease, especially of functional disturbances, which could be referred with certainty to cardiac disease, or atheromatous degeneration of the walls of the blood-vessels. Dantone.

Rampoldi (615) reports several cases of corneal pannus, which had been treated with very slight success, but which cleared up rapidly during several constitutional diseases (pneumonia, erysipelas, cholera). Dantone.

Schleich (616) reports the results of his investigations of the eyes of 127 epileptics. There were no marked changes in the fundus, the absence of optic neuritis, choked disc, and well-defined atrophy being especially noticeable, while slight deviations from the normal were of frequent occurrence. The absence of congenital anomalies is also noteworthy, as well as the frequent occurrence of hypermetropia and strabismus, and the absence of paralysis of the muscles.

Snell's (617) case was that of a child aged 8, who, since she was 18 months old, had from time to time been subject to attacks of ptosis and paralysis of the third nerve. The attacks came on with sickness of stomach, intense pain in the head, and constipation. The parents gave a neurotic history. The father suffered from "tic," and the mother was subject to headaches.

Fitzgerald.

Uhthoff's (618) paper on the influence of chronic alcoholism on the human organ of vision is based on very extensive and accurate observations of a very large material. It treats, in the first place, of the pathologico-anatomical changes in the optic nerve, which were found to be due to specific retrobulbar optic neuritis, as was proven by the post-mortem examination of the relatively large number of six cases. Then follow the clinical histories and a description of the microscopical condition, to which is added that of a case of tabes, with unilateral quadrant-shaped atrophy of the optic nerve, as it forms an important contribution to our knowledge of the course of the fibres in the optic nerve, in connection with the cases of retrobulbar neuritis from alcoholism with degeneration of the papillo-macular fibres. Uhthoff confirms the results found by other observers as to the course of the fibres in the optic nerve, chiasma, and tractus, except in a few unimportant particulars. He did not find that the shape of the degenerated portion changed so rapidly from the oval to the wedge at the entrance of the blood-vessels into the nerve, as found by Samelsohn ; neither did he find that the layer of ganglion cells had completely disappeared in the corresponding part of the retina. Uhthoff then adds the results of the ophthalmoscopic examination of 1,000 patients suffering from severe alcoholism, and likewise of 100 cases of toxic amblyopia, according to which pallor of the temporal half of the disc was observed in 13.9 % of all cases of severe alcoholism. For the interesting particulars see the original.

The patient of WICK and ALT (619) was a young farmer of 27, who presented the usual history of cerebral growths. Alt made the ophthalmic examination and the histological examination of the tumor. The latter was found to be a round-cell sarcoma. There was no optic neuritis ; but the optic nerves were both embedded in the growth, which had invaded the orbit, having broken through the posterior orbital wall. The growth had also invaded the optic-nerve tissue itself in places. BURNETT.

REVIEWS.

CHAS. F. PRENTICE. **A Treatise on Simple and Compound Ophthalmic Lenses,** their refractive and dioptric formulæ, including tables of crossed cylinders and their sphero-cylindrical equivalents. N. Y.: James Prentice & Son. Pp. 40. Price $1.50.

Of all the simple non-mathematical treatises on the properties of lenses that we have seen, this is incomparably the best. The style of the text is, at times, a trifle awkward, but the diagrams are of such surpassing excellence as scarcely to need explanation. The teacher of the average medical student will hail this little work as a great boon, for while there is not a formula in the book, the whole of the fundamental principles of refraction (excluding, of course, any special application to the size and distance of the image) are represented with the greatest simplicity and clearness. The diagrams showing refraction by cylinders and sphero-cylinders are peculiarly happy in their clearness.

DR. L. WEBSTER FOX and GEO. M. GOULD. **Compend of the Diseases of the Eye,** including refraction and surgical operations. Quiz compends. No. 8. Pp. 148. Phila.: P. Blakiston, Son, & Co. 1886. Price $1.00.

This little work is designed, as are so many others, for the use exclusively of the student and general practitioner, and therefore criticism from the standpoint of the specialist is, in a measure, disarmed. It is interesting, however, to note, in looking over such a work, what the authors consider of most importance and as expressing their ideas of the essential principles of the science of ophthalmology.

In examining this small brochure after this manner, we find the authors open-eyed, active and alert in grasping new ideas, and quite happy in putting these ideas tersely and some of them with quite a degree of originality. This desire for originality, we regret to observe, has on some occasions a tendency to pass the limits of a simple scientific statement of a fact, and to become, in no small degree, sensational. Examples of this are the following, among the "clinical hints and maxims": "Myopia is produced by the belief that to read a newspaper (to be told what other people see) is of more value than to see for one's self." "Astigmatism is an invisible and elusive imp of mischief, requiring much keenness and patience to hunt him down. His hiding-place is the ciliary muscle; his disguise amblyopia. He hates atropia as his father is said to hate holy water."

The statistical reports given in the appendix are not sufficiently extensive or accurate to be of much value, and it is to be regretted that they were not made fuller.

On the whole, however, the work is cleverly and judiciously done, and the young practitioner who relies on it cannot go far wrong.

FERD. v. ARLT.

OBITUARY BY DR. C. HORSTMANN.

[Translated by H. KNAPP.]

On the 7 May, '87, F. v. Arlt, the Nestor of German ophthalmologists, died in Vienna after long suffering. Together with Donders and the too-soon-departed A. v. Gräfe, they were the most brilliant stars in modern ophthalmology. Born on the 18th of April, 1812, the son of a poor blacksmith in Obergraupen by Teplitz in Böhmen, he was brought up among the simplest surroundings. At his eighth year he was taken to one of his relatives, a school teacher at Weisskirchlitz to be brought up for the same calling.

When thirteen years of age, showing no inclination to become a teacher, he entered with his elder brother Dominick, the Lyceum at Leitmeritz, where he was prepared for the clergy. From the third year at the Lyceum, he made his living by giving lessons. In 1831 Arlt and his brother entered the university at Prague, and following his inclination for natural sciences, studied medicine instead of theology. He was able to do so by accepting the position of tutor. Of all his teachers, the professor of ophthalmology, J. N. Fischer, inspired him most, and awakened in him his predilection for this branch of medicine. Arlt graduated in 1839. Having attended for three months, the lectures and demonstrations of Rokitansky and Skoda, besides the operating courses of Fried. v. Jäger, in Vienna, he was appointed assistant physician to Fischer's eye-clinic, which position he retained until 1842. In that year he settled in Prague as a physician, practising medicine and surgery besides ophthalmology until 1846, when on Fischer's nomination he was chosen assistant professor of ophthalmology. In 1849, declining a call to Leipzic, he obtained the regular professorship at Prague, which he held until 1856. During that time he contributed to the literature of his specialty, a number of excellent works of which we need only mention his text-book on the "Diseases of the Eye." (3 vol. Prague, 1851, 1853, and 1856.)

In 1855 he entered, with C. Donders, into the editorial staff of the *Archiv für Ophthalmologie*, founded by A. v. Gräfe. Although the number of papers which Arlt published in this journal is comparatively small, they were all distinguished by the clearness of their contents and their valuable anatomo-clinical investigations.

In 1856 Arlt received and accepted the appointment to the chair of ophthalmology at the University of Vienna, made vacant by Rosas' death. He occupied this position interruptedly until July, 1883, when, having passed his seventieth year, in undiminished mental strength, he resigned his office in compliance with the laws of Austria. What he has accomplished in Vienna as a teacher, scientist, and ophthalmic practitioner, is still so fresh in our memory as to require no further mention. By his retirement Arlt's scientific and practical labors received no restraint whatever, of which fact his papers, "On Glaucoma," and "On Extraction of Cataract," appearing at that time, are sufficient evidence.

During the summer of 1886 he was suddenly seized with gangrene in his left leg, necessitating its amputation. Owing to his hardy constitution, he recovered promptly from this operation, but relapses soon appeared, until after long suffering, relieved by the devotion of his affectionate daughter, he died a few weeks after his seventy-fifth birthday.

Arlt was in the truest sense of the word a "self-made man." By means of his very extraordinary ability, his uncommon energy, and his untiring industry, the son of a poor blacksmith succeeded in acquiring the highest academical honors. It is one of his merits that ophthalmology, from being an appendage of surgery, rose to the rank of an independent science. His penetrative mind recognized the etiological conditions of the diseases of the eye. His anatomo-pathological investigations are the first remarkable attempts in ophthalmology. Before any other we have to give Arlt credit for having established the fact that myopia depends on a prolongation of the antero-posterior diameter of the eyeball. To cite all his papers, which in their scientific aims never neglected practical points of view, would lead too long. We can mention only the most important ones : "Care of Eyes in Health and Diseases," together with an appendix on eye-glasses (Prague, 1846); "Diseases of the Eye" (3 vol., Prague, 1851, 1853, 1856); "Accidents to the eye" (Vienna, 1875); "Operative Surgery of the Eye" (Gräfe-Sämisch, Encyclopedia of Ophthalmology, vol. iii., part 2. Leipzig, 1874); "Shortsightedness, its Origin and Causes" (Vienna, 1878); "Clinical Exposition of the Diseases of the Conjunctiva, Cornea, and Scelera, also of the Iris and Ciliary Body" (Vienna, 1881); "Contribution to the Knowledge of Glaucoma" (Vienna, 1884).

Arlt was the first to give an impulse to the introduction of test-types, which, as is well known, were greatly improved by E. v. Jäger, and more especially, by Snellen. It was likewise owing to his initiative that the selection of spectacles is no longer made in a routine way by the optician, but based on scientific principles by the oculist. Arlt stood at the head of his time, not only as a scientific investigator, an excellent oculist, and a prominent operator; but also as an academic teacher, he was of the first importance. His delivery did not excel by its rhetorical art or ingenious sentences, it was the simplicity and clearness of his speech, the precision of his expressions, the logical analysis of the morbid process that captivated his audience. Physicians of all parts of the world, almost all of the prominent living oculists, have attended his clinics for a shorter or a longer time, to learn his views by personal observation. Also A. v. Gräfe, who was his junior by seventeen years, visited him at Prague in the fall of 1848, and not in a low degree, it was Arlt's merit to have induced the most eminent ophthalmologist of all times to devote himself exclusively to the study and cultivation of that branch of medicine. With great pride, he said of his previous pupil, to whom he was connected by the most intimate friendship, that from the former teacher he had become the pupil of von Gräfe. The majority of the late assistants of Arlt's are now engaged as professors at different universities; *e. g.*, Businelli at Rome, Rydel at Krakau, O. Becker at Heidelberg, Schuleck at Budapest, Fuchs at Vienna, Sattler at Prague. Others have gained an excellent reputation as ophthalmic practitioners, *e. g.*, Arlt jun., Bergmeister, v. Reuss, and Köller in Vienna, Kirschbaumer at Salzburg, Brettauer at Trieste, and Denk at Luiz. In spite of the high station at which Arlt had arrived, his life was distinguished by uncommon simplicity and contentedness. A touching goodness of heart was one of his prominent characteristics. Never forgetting how full of hardship his own youth had been, he always had an open hand to his needy fellow-men. He was a fatherly friend to the poor student. He always retained a warm attachment to his home in the Bohemian mountains, and every year he visited his birthplace to aid the numerous people afflicted with diseases of the eye in that vicinity. Not only has the old Vienna medical school, so famous by Rokitansky, Oppolzer, Skoda, Pitha, Hebra, and others, lost by the death of Arlt its last representative, but the whole ophthalmological world. Thousands of thankful patients and pupils, mourn with deepest sorrow the decease of Arlt, whose name will occupy a permanent place in the history of ophthalmology.

VOL. XVI. No. 4.

ARCHIVES OF OPHTHALMOLOGY

BACTERIOLOGICAL INVESTIGATION OF THE ANTISEPTICS USED IN OPHTHALMOLOGY.*

By Dr. JOHN E. WEEKS, New York.

THE objects of the investigations and experiments[1] that form the basis of this paper are:

1. To ascertain in how far it is necessary to employ asepsis and antisepsis in ophthalmology.

2. To ascertain the relative antiseptic qualities of the various topical remedies employed in ophthalmology, and their fitness for such use.

3. To ascertain the irritant or non-irritant effect of these remedies on the conjunctiva and on cut surfaces.

4. To ascertain the best methods of sterilizing instruments.

In endeavoring to ascertain the necessity for the use of antiseptics in ophthalmology, I have made microscopical examinations of, and cultivations on nutrient agar from, the surface epithelium of the face and lids, the cilia, hair of brow, the lachrymal fluid in the normal conjunctival sac, secretions in mild and severe cases of conjunctivitis, dacryocystitis, eczema vesicles on the face, also on the conjunctiva and cornea (phlyctenular processes), pustules in blepharitis ciliaris, etc.

If a few scales of the surface epithelium be removed from any part of the body, under ordinary conditions, and placed on nutrient agar or gelatine, a cultivation of one or more varieties of micro-organisms will develop. Pyogenic germs are not infrequent. If a cilium or hair from the brow be treated in the same manner, the same thing will occur. The base of the cilia and the marginal spaces of the lids are favorite lurking-places for a number of forms of germs on account of the moisture and shelter afforded by the lachrymæ, glandular secretion, and cilia.

---

* Read before the Section in Ophthalmology and Otology, Academy of Medicine, New York, October 17, 1887.

[1] They were made at the Laboratory of the N. Y. Ophthalmic and Aural Institute.

In making cultivations from the lachrymal fluid in the normal conjunctival sac of one hundred and twenty eyes in children, the staphylococcus pyogenes was found three times. In the cultivations from the conjunctival sacs of sixty-five cataractous eyes, the staphylococcus pyogenes was found ten times. Eight of the last mentioned were operated on for the extraction of cataract, six at the Ophthalmic and Aural Institute by Dr. Knapp. Of these cases two had mild chronic dacryocystitis, with slight redness of the conjunctiva ; five had a mild conjunctivitis. Before the operation was performed the lids and the surrounding integument were cleansed with soap and water, and the conjunctival sacs thoroughly washed with Panas' solution. The eye in one of the cases of dacryocystitis was lost by suppuration, the wound remaining free from infection until after forty-eight hours had elapsed. In the second case of dacryocystitis the wound became infiltrated on the second day. Frequent emptying of the lachrymal sac and thorough cleansing with an aseptic solution arrested the suppurative process, the infiltration disappeared, and the wound healed without loss of corneal substance. In one of the cases in which a slight conjunctivitis existed, the cataract had a yellowish-white color, and the operation was protracted. On the third day the corneal wound became infiltrated ; pain and chemosis were present. The wound opened and prolapse followed. The whole cornea became hazy. The eye was frequently cleansed with Panas' solution ; the process limited itself, and subsided with no apparent loss of corneal substance. $S = \frac{20}{200}$ three months later. With the exception of very slight haziness along the track of the wound, the other cases went on to recovery without any untoward symptoms. In the cases operated, where no staphylococci pyogenes were found, no trouble was experienced from septic infection.

It is well known that the human conjunctival sac will tolerate many varieties of bacteria without becoming inflamed. In a series of experiments, the results of which were embodied in a former paper on "The Pathogenic Microbe of Acute Catarrhal Conjunctivitis," *Medical Record*, May 21, 1887, I have shown that if a small amount of a watery emulsion of the staphylococcus pyogenes, bacillus subtilis, Leber's bacillus, and some seven other varieties which were isolated by cultivations from the conjunctiva, be placed in the normal human conjunctival sac, no reaction follows. As long as the epithelium is intact, no trouble is likely to occur. However, if the epithelium becomes detached, if the pyogenic germ is introduced beneath the epithelium, beneath the skin, or deep into the tissues, suppurating surfaces, pustules, phlegmon, and abcess are the results. Since it is a fact that destructive germs are frequently present, and that their presence cannot be determined in all cases by simple inspection, it becomes necessary to employ *antiseptics iu all cases* requiring operative procedure. The employment of antiseptics is also necessary to combat all deleterious processes in which bacteria are concerned.

We may well ask ourselves at this point what we should require of the antiseptics employed. Is it the destruction of the germ in the shortest possible time, or is it the simple mechanical removal of the germ by the use of a solution or substance that possesses no antiseptic effect in the time in which the germ is exposed to its influence? The application of liquids to the conjunctival sac, to suppurating or cut surfaces, unless by more or less constant irrigation, means that the liquid comes in contact with the surface in its undiluted form for a fraction of a minute only; it then flows off and is diluted by the secretions with which it mingles. Ointments and powders may be made to remain in contact with the surfaces for some minutes. If we wish to know the relative value of antiseptics in ophthalmology, as well as in general surgery and medicine, we must determine the *relative time* in which they produce the death of germs in solutions not strong enough to affect the tissues injuriously; also their stability and their irritant or non-irritant properties.

Many experimenters have undertaken to ascertain the antiseptic value of various substances by mixing the food medium with the antiseptic in known proportions, inoculating this prepared food with the germ used for the experiment, and ascertaining the proportionate mixture that would prevent the development of the germ. Others have impregnated putrefying liquids with the antiseptic, and have determined the proportionate mixture that would arrest the process. Sternberg[1] mixed the germ with solutions of the antiseptic in various proportions, and exposed them to its influence for two hours. He then inoculated food media with these germs, and by their development or non-development determined the effect produced on the vitality of the germ. These experiments, as Sattler says,[2] have no analogy in the use of antiseptics in ophthalmology. The tissues cannot be placed in the condition of a food medium impregnated with an antiseptic, nor can liquid antiseptics be kept in contact with the tissues for two hours.

In testing the antiseptic value of the topical remedies employed in ophthalmology, I have employed the staphylococcus pyogenes, for the reason that it is the most prevalent of pyogenic germs and is the cause of the suppuration of wounds, abscesses, and pustules in probably nine tenths, at least, of all cases. It is also, in my opinion, the cause of the moist eczema of writers and of phlyctenular processes. Sattler[3] found the staphylococcus pyogenes in 87% of the cases of dacryo-cysto-blennorrhœa that he examined. Cultivations of this germ were made from eczematous pustules or vesicles situated on the lids and face of patients. Before the vesicle had ruptured, the surface of the skin was rendered sterile, the vesicle or pustule opened with a sterile platinum rod, and the material adhering to the rod introduced into a tube of nutrient agar. A growth was produced in every instance.

---

[1] "Germicidal Value of Certain Therapeutic Agents," *Jour. of Am. Med. Sci.*, April, 1883.

[2] Bericht d. Oph. Ges., Heidelberg, 1883.

[3] *Ibid.*, 1885.

Cultivations were made from time to time, in order to have fresh virulent germs to use as needed. Their virulence was tested by passing a little of the growth into the anterior chamber of a rabbit's eye, using a cataract knife that had previously been dipped into an emulsion of the germs for the purpose. Destruction of the eye by panophthalmitis took place in every case.

Methods of Testing Watery Solutions.

Solutions of the various substances were made in sterilized water and were placed in test-tubes. Sterilized platinum rods were dipped in an emulsion of the germs in sterilized water and the rods immediately immersed in the solution. Straight rods were employed, in order to permit the liquid to reach all the germs. Koch, Sattler, and others have saturated short pieces of fine silk thread with a cultivation of the germs that they have experimented with, and have then subjected them to the action of the antiseptic. When the exposures are for fractions of a minute this procedure is objectionable, as it requires some time for the solution to penetrate to the interior of the mass. In experiments where it was desirable to expose the germ to the action of the antiseptic for some minutes, the germs were mixed with the solution—the method employed by Gærtner and Plagge,[1] and by Sternberg.

Those remedies which, in strong solutions, are very irritating to mucous membranes were tested only sufficiently to show beyond a doubt their antiseptic properties in solutions such as it is safe to apply to the conjunctiva.

The results given are those determined after repeated tests. The experiments aggregate about twelve hundred.

Bichloride of mercury, soluble in sixteen parts of cold or three of boiling water (U. S. D.). When in solution in distilled or spring water, a white precipitate is deposited, usually of the mild chloride. This may be obviated by adding a very small amount of sodium chloride to the solution.

---

[1] *Arch. f. klinische Chirurgie*, p. 32, 1885.

A solution of 1 : 500 destroys vitality in exposures of 10 seconds.
“ “ “ 1 : 1,000 “ “ “ “ “ 45 “
“ “ “ 1 : 2,000 “ “ “ “ “ 1⅓ minutes.
“ “ “ 1 : 4,000 “ “ “ “ “ 2½ “
“ “ “ 1 : 5,000 “ “ “ “ “ 3 “
“ “ “ 1 : 10,000 “ “ “ “ “ 5 “
“ “ “ 1 : 20,000 “ “ “ “ 12 to 15 “

These experiments correspond very closely with those obtained by Sattler in his experiments on the bacillus of jequirity. Gærtner and Plagge found the solutions of the bichloride to be a little quicker in their germicidal action than my experiments show.

A 1 : 4,000 or 1 : 5,000 solution of the bichloride may be dropped into the conjunctival sacs of most patients without causing any irritation. In some cases 1 : 15,000 causes considerable irritation. Solutions of 1 : 1,500 and 1 : 2,000 may be used on fresh-cut surfaces, in abscess cavities, etc., without producing any deleterious effect.

Bisulphate of mercury, soluble in about 1 : 7,000 of cold water (U. S. D.).

A solution of 1 to 8,000 destroys vitality in exposures of four minutes. If this solution be placed in the conjunctival sac, a slight smarting sensation is produced, which passes away in a few minutes, leaving no unpleasant sensation.

Biniodide of mercury, very sparingly soluble in water [1 : 40,000 (?)], destroys vitality in exposures of four days.

Panas' solution, which has been used largely by oculists in this and other countries, has the following formula:

℞

Hydrarg. biniodidi	0.05 = 1
Alcoholis (absolute) . . .	20.00 = 400
Aquae	1,000.00 = 20,000

♏.

If absolute alcohol is used, the mercuric salt remains in solution; if the ordinary 95 % alcohol be employed, the mercuric salt is not dissolved. Panas' solution is slightly irritating to the conjunctiva, presumably on account of the alcohol that it contains. If cotton or gauze be moistened with Panas' solution, and held in contact with the tissue, it often produces erythema, and in some cases blisters are produced, again, largely the effect of the alcohol. Panas' solution destroys the staphylococcus in exposures of from two to three days.

Bromide of mercury, sparingly soluble in water; the saturated solution destroys the vitality of micro-organisms after exposures of some days. Remains sterile on standing.

Green iodide of mercury, not soluble in water, has no effect on germs when it is suspended in water.

Yellow oxide of mercury, very sparingly soluble in water; the saturated solution destroys the vitality of germs in exposures of from two to four days.

Red oxide of mercury possesses the same value as an antiseptic and germicide as does the yellow oxide.

The *mild chloride of mercury* is not soluble in water; however, when mixed with water in the proportion of 1 : 500, the ordinary preparations are antiseptic to a low degree, very probably an account of containing a small amount of the bichloride, although on testing the liquids no bichloride could be detected.

Nitrate of silver. I am surprised to know that so little has been done with this salt in the way of experimentation. Ratimoff and Miquel, quoted in Flügge's work on micro-organisms, have determined its power to arrest putrification, which it does in about the proportion of 1 : 10,000. Credé and others have studied its clinical effects on the gonococcus, and some few other experiments have been made with it. In the experiments that the writer has made with it, the nitrate of silver occupies a position near the head of the list of antiseptic remedies.

A solution of 1 : 10 destroys vitality in exposures of 4 sec.
" " 1 : 50 " " " " " 8 "
" " 1 : 100 " " " " " 12 "
" " 1 : 500 " " " " " 1⅓ min.
" " 1 : 1,000 " " " " " 4 "

It will thus be seen that the nitrate of silver, in solutions that cause but little irritation to mucous surfaces, is a most excellent germicide. These experiments fully explain its great efficacy in the treatment of eczema, purulent affections of the eye, otorrhœa, etc. Its lack of stability and its staining qualities unfit it for many purposes.

Salicylic acid dissolves in about 1 : 600 of water, at a temperature of 62° F. (U. S. D.).

A solution of 1 : 600 destroys vitality in exposures of 1 min.
" " 1 : 1,000 " " " " " 4–5 "

Care must be taken to have the acid pure. In the proportions above mentioned, the reaction is distinctly acid, and considerable irritation of the conjunctiva follows its introduction. It holds a high rank in the list of antiseptic remedies, and is stable.

Permanganate of potash dissolves in 16 parts of water at 60° F. (U. S. D.).

A solution of 1 : 50 destroys vitality in exposures of 20 sec.
" " 1 : 100 " " " " " 1 min.
" " 1 : 200 " " " " " 5 "
" " 1 : 500 " " " " " 20 "

The solutions of this salt are of a deep purple color, and are not very stable. In solution of 1 : 100 it is very irritating to the conjunctiva.

Potassium hydrate, in solutions of 1 : 5, destroys vitality in exposures of 5 minutes. It is of no value as an antiseptic in opthalmology.

Carbolic acid in a solution of

1 : 20 destroys vitality in exposures of ¼ min.
1 : 40 " " " " " ½–1 "
1 : 60 " " " " " 4 "

When the solution of 1 : 40 is introduced into the conjunctival sac, quite severe irritation and pain is experienced for a few seconds, a sense of numbness and dryness is then experienced, which lasts for some minutes; the surface becomes slightly blanched. This passes away after a few hours, and is followed by congestion. It may be used in wounds without injuring the tissues. The spores of spore-forming bacilli are slowly affected by carbolic acid

1 : 40, and in solution of 1 : 20 it requires some hours to destroy them. In solutions of 1 : 1,000 it remains sterile on standing. Carbolic acid is quite stable, but on account of the irritation that it occasions, cannot well be used as an application to the conjunctiva in solutions of sufficient strength to be germicidal.

Alcohol. Koch's conclusions that absolute alcohol has but little or no effect on dried germs is confirmed by the experiments of Sattler and others. On germs that are moist or in process of development, however, the facts are quite different.

Absolute alcohol destroys vitality in exposures of 4 to 12 sec.
90 % " " " " " 20 to 30 sec.
66 % " " " " " 10 to 15 min.

Even 10 % alcohol is very irritating to the conjunctiva.

Chlorine water. Distilled water saturated with chlorine gas is placed by Sattler at the head of the list of antiseptic and germicidal solutions. Certainly it is a very good antiseptic, and possesses an advantage over many others in that it does not produce any marked irritation when applied to the conjunctiva or instilled into the ear in purulent otitis media. It stands about on a par, as regards its germicidal properties, with solutions of sublimate and the nitrate of silver, which cause no more irritation than does the chlorine water. It however lacks stability, as the following shows:

Saturated solutions newly made destroy vitality in exposures of 1½ minutes. Corked, but kept in a light warm place 24 hours, 4 minutes. Loosely corked for 48 hours after making, more than one hour. Used by the oculist in fresh solutions it is very efficacious. Prescribed to patients it often fails from lack of care in keeping, and lack of knowledge as to how it should be applied. Chlorine water should be tightly corked and kept in a dark, cool place.

Hydrogen dioxide, formula HO_2, commences to decompose at a temperature of 60° F., giving off oxygen and being converted into water. When unchanged it destroys the vitality of pyogenic germs in exposures of 1 to 1½ minutes. If kept at the temperature of the room ordinarily corked for 24 hours it is much less effective. After 48 hours it destroys vitality in ½ to 1 hour exposure. If tightly corked and kept at the temperature of the room, in glass, an explosion is apt to follow. It should be kept on ice and tightly corked, in order to be of value as an antiseptic for any length of time.

Sulphuric acid, 1 : 10, destroys vitality in exposures of ¾ to 1 minute; it is however very irritating to mucous membranes, and is unfit to use as an antiseptic in ophthalmology on that account.

Salicylate of soda in solution of 1 : 10 destroys vitality in exposures of 8 to 10 minutes.

Boric acid. So far as I can determine boric acid has no germicidal effect whatever. In a saturated solution, about 1 : 25, the staphylococcus pyogenes remained vital for 10 days. According to Sternberg and others it possesses the power of preventing development in solutions of 1 : 400 while the germ remains in the solution. It does not possess the power of destroying vitality, and is therefore useless as a germicide.

The *stronger water of ammonium* has no effect to destroy vitality in exposures of 10 minutes.

The potassic sulphate of alum in saturated solution (about 1 : 15) has no effect on this germ in exposures of 2 hours.

The following solutions and liquids do not destroy vitality in the staphylococcus pyogenes, in exposures of 48 hours, the time employed for nearly all:

Atropine sulphate, 1 to 100—1 %

Arsenious acid, sparingly soluble in water, saturated solution.

Bicarbonate of soda, saturated solution, about 1 : 13 (U. S. D.).

Bête naphthol, probably not soluble in water.

Bromide of potassium, solution 1 : 10.

Chloral hydrate, solution 1 : 50.

Castile soap, 2 % exposed 12 hours.

Common laundry soap, 2 % exposed 12 hours.

Camphor water.

Carbonate of ammonium, solution 1 : 5.

Chloroform.
Cocaine muriate, 3 %.
Eserine sulphate, 1 %.
Ether, sulphuric.
Glycerine.
Homatropine, 1 %
Iodine to saturation in water, 100, chloride of sodium, 2.
Potassium bichromate, 1 : 20.
  " *chlorate*, 1 : 16 (U. S. D.).
  " *iodide*, 1 : 10.
Sulphate of iron, 1 : 5.
  " *copper*, 1 : 5.
Sodium chloride, sat. solution, 1 : 3
  " *bicarbonate*, " 1 : 16 (U. S. D.).
Zinc acetate, 1 : 10
  " *sulphate*, 1 : 10.
  " *chloride*, 1 : 20. The zinc chloride found in commerce is seldom pure, but contains the arseniate of zinc which does not dissolve in water (U. S. D.).

Oils.

Oil of cade destroys vitality in exposures of 5 minutes. The following have no action to destroy vitality in exposures of 24 hours:

Oil of cloves.
Oil of turpentine.
Thymol, pure and in watery solution.
Eucalyptol, pure and in watery solution.
Benzole.

Ointments.

The following ointments were experimented with and found to produce no effect on the vitality of the germ in exposures of 36 hours:

Mercurial ointment (officinal).
Oint. of the yellow oxide of mercury, 1½ %.
  " " " benzoate of mercury, 1½ %.
  " " " iodoform, 10 %.
  " " " iodol, 10 %.

My experiments, like those of Koch and others, prove that oils and ointments have but little or no effect on germs contained in a watery menstruum. That they affect bacteria in the tissues or on the integument or on mucous membranes, as oils, or while in solution with oily substances, is extremely doubtful.

Powders.

In conducting these experiments a method resembling that followed by Koch, Sattler, and others was employed, namely: pieces of fine silk thread, about 1 *cm* in length, were placed in a test-tube and subjected to a temperature of 140° C. for three fourths of an hour. A number of pieces were then removed and placed in a test-tube of nutrient agar, containing some water of condensation, which had been previously inoculated with the staphylococcus pyogenes, and permitted to remain until the threads were saturated with the growth. These were then removed with sterilized forceps, first placed in sterile water to add moisture, and then transferred to the powder. After remaining in the powder the required length of time, they were again dipped in sterilized water to remove excess of powder, and were then transferred to nutrient agar. Parallel experiments were also conducted with the sterile silk by passing it through all the steps of the process except introducing it to the cultivation of the germ, to prove that no development would take place under these last conditions. In nearly all cases an intimate mixture of germs with the powders was also made and cultivations taken from these mixtures.

Calomel destroys vitality in exposures of 3 minutes.
Resorcin " " " " " 8 to 12 hours.
Bête naphthol destroys vitality in exposures of 8 to 12 hours.
Iodoform retards development after 12 hours' exposure.

From some iodoform that had stood exposed to the air for a few days, a cultivation of a bacillus, which produces a strong putrefactive odor in recent cultures, was made by sprinkling a little iodoform powder on the surface of some nutrient agar.

Iodol has no effect in exposures of 36 hours.
Chrysophanic acid, no effect.

Subnitrate of bismuth, no effect. By dusting on nutrient agar a little of this powder, which had been kept in a paper package for some months, cultivations of two forms of germs were obtained.

Boric acid. In the experiments with threads and by intimate mixtures of the germs with the powder, *boric acid failed to produce any effect whatever on the vitality of the germ*, in exposures of 36 hours. These results correspond very closely with those arrived at by Koch, Sattler, and Sternberg. As a germicide boric acid is of little or no value. It may however be added to liquids to prevent further development of germs that they may contain.

The results of these experiments, confirming in greater part the results obtained by others, indicate as efficient antiseptic remedies, which can be used on the tissues without causing undue irritation, the following substances:

Bichloride of mercury, 1 : 1,000 to 1 : 2,000 on cut surfaces, on suppurating surfaces, and on the integument ; 1 : 4,000 to 1 : 8,000 on mucous membranes.

Nitrate of silver, 1 : 100 to 1 : 500 on mucous membranes and on suppurating surfaces.

Chlorine water on mucous membranes and on suppurating surfaces.

Hydrogen dioxide, as chlorine water.

Carbolic acid, 1 : 40 on cut surfaces and suppurating surfaces and on the integument.

Permanganate of potash, 1 : 100 to 1 : 200 on cut surfaces and on suppurating surfaces.

Alcohol, 66 % on the integument and on suppurating surfaces, as in otorrhœa.

The *oil of cade* may be used to advantage in eczema, on account of its antiseptic and germicidal properties. *Calomel* is by far the most efficient antiseptic remedy in the form of powder that we have. *Iodoform*, which is highly valued by some oculists for use in infiltrated ulcers of the cornea, in gonorrhœal ophthalmia, and for the dressing of wounds, may be of service if it can be kept in contact with the parts for a number of hours. It is not irritating to mucous membranes or to cut surfaces but is very slow in its antiseptic action.

Antiseptic dressings, so-called, are usually only aseptic. In order that bacteria may develop, it is necessary that they be on a surface containing 50 to 70 % of water. We can thus readily see that bandage material must be free from all germs but those that are deposited on it from the air or from objects that it comes in contact with. It is antiseptic only when impregnated with an antiseptic substance and moistened. So long as a wound can be kept dry, healing will progress without the formation of pus, whether it is bandaged or not, simply because germs cannot develop if moisture is not present.

The *sterilizing of instruments* may be classed under the heads of: 1, *mechanical;* 2, *chemical;* 3, *thermal.*

(1.) As it requires moisture for the development of germs, ordinary clean linen may be considered, and is for all practical purposes, sterile and suitable for the cleansing of instruments. If an instrument be smooth and well polished, no fears may be entertained of its retaining any considerable number of germs. If it be in the least rough, however, it readily retains septic material. The minutest rust-spot affords lodgment for numbers of germs, between the ridges of steel, which most careful rubbing with sterile linen will not dislodge. The mechanical cleansing of instruments is safe only when the instruments are smooth, and when no material containing pyogenic germs has been allowed to dry on them. To test this I took some cataract and other knives, squint-hooks, scissors, etc., and cleansed them by dipping them in ordinary water, drying and polishing them with a clean linen towel. They were then passed into nutrient agar. No development of germs occurred. The instruments were dipped into a thin emulsion of pyogenic germs, then washed and polished as before, and introduced into nutrient agar. Cultivations of pyogenic germs appeared in some of the tubes, into which rough, slightly rusted instruments were passed. The emulsion was then permitted to dry on some of the instruments. They were afterwards washed, and carefully polished as before. Cultivations appeared in all of the tubes inoculated with the roughened instruments, and in about one third of the inoculations made with the instruments that were to all appearances smooth.

(2.) For the *chemical sterilization* of instruments, the greater number of efficient antiseptic solutions are objectionable. *Nitrate of silver* gives a deposit of the oxide on steel which discolors it and dulls the cutting edge. The *bichloride of mercury* is open to a similar objection. If an instument is placed in a 1 : 2,000 solution of the bichloride it soon acquires a deposit which roughens it and dulls its edge. This deposit occurs after some minutes' exposure. Where a roughened spot is present on the instrument the deposit appears more rapidly.

Carbolic acid in solutions of 1 : 20 or 1 : 40 is effective in exposures of three to five minutes; does not tarnish the steel, nor does it lessen the keenness of the edge, providing the instrument is not left in the solution for more than one half to one hour. This antiseptic is open to the objection that if it comes much in contact with the surgeon's fingers it produces an anæsthetic effect, causing slight numbness and slight destruction of surface epithelium, which leaves the fingers in a roughened condition. This may easily be obviated by having the handles of the instruments kept free from the solution. The instruments may be passed through some non-irritating aseptic solution, such as Panas' solution or recently boiled water, before using.

Alcohol, either absolute or 95 %, may be used for the sterilization of instruments; it does not affect the cutting edge of instruments, but is not perfectly reliable, as it does not destroy the vitality of germs that are dried on the instruments.

Salicylic acid in solution of 1 : 1,000 may be employed. It is necessary to permit the instrument to lie in the solution about five minutes before all germ life is destroyed. An immersion of four to six hours causes the steel to become slightly affected.

Permanganate of potash, *chlorine water*, *hydrogen dioxide*, although germicidal, are not suited for the sterilization of instruments.

We have then as chemical agents for the sterilization of instruments the bichloride of mercury in solutions of 1 : 2,000, in which the exposure must be very short; carbolic acid, 1 : 20 or 1 : 40, the last of which requires four to five minutes; salicylic acid in solutions of 1 : 600 or 1 : 1,000 exposure five to ten minutes.

(3.) For the *thermal* disinfection of instruments, either dry or moist heat may be employed. Sternberg[1] has shown that all micro-organisms are killed by being subjected to temperatures varying from 52° to 100° C. in exposures of ten minutes. The staphylococcus pyogenes and all non-spore-forming micro-organisms are destroyed by temperatures not below 74° C. This is the case where moist heat is employed; if dry heat be employed the temperature must be higher, but it need not be high enough to oxidize the metal. Such heat may be employed by the use of small ovens, the temperature of which may be regulated by the flame and thermometer. A number of such sterilizers are to be had. It is unsafe to pass instruments through the flame of a lamp or Bunsen burner, as the steel is quickly oxidized and the edge blunted. For the sterilization of instruments by heat, water, at a temperature of 90° to 100° C., is much to be preferred. It surely destroys the vitality of all pyogenic, and of almost all pathogenic, germs in exposures of two to three minutes. Boiling water destroys the staphylococcus pyogenes on contact.

Mechanical, combined with *thermal*, sterilization in the use of hot water, is, to my mind, the best method of sterilizing instruments. As, however, the procuring of hot water is attended with some degree of trouble, and as a solution which can always be kept ready is more convenient, the combination of the mechanical with the chemical will probably be most used. The water used should be previously boiled and the antiseptic employed be either bichloride of mercury, carbolic acid, or salicylic acid. These act promptly and are efficient.

To cleanse the site of the operation soap and water should be used to remove oily substances and rough dirt, followed by a solution of bychloride 1 : 2,000 to 1 : 5,000 for germicidal effect. The surgeon's hands may be cleansed with a solution of 1 : 2,000.

---

[1] *Amer. Jour. of Med. Sciences*, July, 1887.

ON OCULAR SYMPTOMS DUE TO NASAL DISEASE.

By Dr. H. GRADLE, Chicago.

IN the various researches by the late Dr. Hack on the reflex symptoms of nasal disease may be found repeated suggestions that the eye as well as other parts can suffer in consequence of nasal anomalies. More direct communications on this subject have since been published by Gruening,[1] Ziehm,[2] and Bettman.[3]

Ever since Hack's first writings the author has studied this subject clinically, and has arrived at results confirming those of the previously mentioned writers, as well as extending them in various directions. In a general way it may be stated that amongst the different forms of asthenopia and other ocular disturbances not due to a primary disease of the eye there exist many instances the nasal origin of which can be demonstrated by the success of nasal treatment, while in other cases the same etiology can be logically inferred even without this proof. I have furthermore observed that the tedious course of various idiopathic diseases of the eye can be accounted for by nasal complications exercising their secondary injurious influence upon that organ. My observations can be presented perhaps most conveniently in the following order of classification:

1. *Lachrymation* is not rarely the result of nasal disease, without primary lesion of the tear-passage or of the eye. In some of the instances the persistent and annoying flow

---

[1] *Medical Record*, 1886, p. 122.
[2] *Centralblatt f. Augenheilkunde*, July, 1886, p. 222, and May, 1887.
[3] *Jour. of the Amer. Med. Assn.*, May 7, 1887.

of tears followed an acute attack of nasal catarrh. In other cases the watering was not continuous, but varied with the season and was preceded by the signs of irritation of the front part of the nasal passages, viz., sneezing, more or less nasal obstruction, or watery discharge. It is probable that the flow of tears is augmented in a reflex manner by the nasal irritation, while the proper removal of the tears is interfered with by the turgidity of the blood-vessels of the lachrymal duct. From such a diagnosis, however, all cases must be excluded in which there is disease of the tear passage, demonstrable by the presence of pus, or by the resistance met by the lachrymal probe, or by fluid injected through the punctum. Yet, even in cases of diseases of the tear passages, the treatment of nasal anomalies may be an aid to the specific treatment of the disease of the duct. For there exists almost always the history of some chronic though perhaps slight nasal anomaly prior to the occurrence of disease of the tear passage.

2. A marked type of ocular complaint of nasal origin is presented by a combination of a *feeling* of *fulness* of the eyelids and *itching* with or perhaps without *lachrymation*, sometimes with more or less *pain* in the eyes. The ocular symptoms may be intermittent, remittent, or more rarely of a uniform degree persisting for weeks or months. Some of these patients can use their eyes for work without increased discomfort, while in another class asthenopic symptoms appear on reading or working, which put a speedy check on the further use of the eyes. I have found the asthenopic symptoms limited to or more marked in one eye than in the other, rather oftener in this class of cases than in asthenopia from other causes. Without wishing to be too absolute, my observation leads me to claim that in the former class the eye is free from all anomalies and ideal in every respect, while those patients whose symptoms are aggravated by the use of the eyes present some ocular anomaly, be it accommodative or refractive or muscular insufficiency. I may add at once that my diagnosis of nasal reflex has been strengthened in such cases by the very fact that the correction of the ocular anomaly was insufficient to remove

the annoyance, even if it mitigated the asthenopic symptoms. Wherever the eye-strain is persisted in in such instances there follows usually a bloodshot appearance of the conjunctiva. Some of these patients show a hyperæmia of the tarsal portion of the conjunctiva of the lower lid, which I have not been able to remove by any merely local treatment.

In all these instances the nasal disease consists of irritability of the blood-vessels in and underneath the mucous membrane as far as it lines the anterior end of the inferior and sometimes of the middle turbinated bones, and in rare cases also the upper and forward part of the septum, or even the floor of the lower meatus in its front part. The submucous cavernous tissue is permanently enlarged, and can be indented by the probe as if it were an air cushion.

Sudden chilling of the skin, especially of the shoulders, neck, or feet, or the entrance of dust into the nose, gives the patients an obstruction of one or the other side of the nose, generally with a sneezing fit, and often accompanied by watery discharge. Examination shows the nasal membrane turgescent at such times, perhaps sufficient to occlude the air passage. The local and distant reflexes, however, can occur even if the hypertrophy of the cavernous tissue has not reached a sufficient degree to occlude the nostril, provided only that these blood-vessels are temporarily distended. There need not be any congestion of the surface; it may in fact be quite pale.

The view of Hack, that the erection or, more properly speaking, the turgescence of the cavernous tissue is an intermediate indispensable link between nasal irritation and subsequent nervous disturbances, has been considerably attacked by some German rhinologists.[1] My own experience, however, confirms Hack's opinion to a large extent. I can admit that distant reflexes, which sometimes involve the eyes, can take their start from almost any part of a diseased nose or throat. But the large majority of the nasal reflexes which I have seen depended on the anomaly which in short may be termed "irritable nose." By that term I understand that condition of the nose which leads to sudden engorgement of the nasal blood-vessels, from slight and sometimes without any traceable provocation, almost always unilateral at a time and accompanied generally by sneezing and often subsequently by watery discharge. During the interval between the attacks the nose may feel and appear normal in any respect. This "irritable nose" is but an exaggeration of the normal response of the nasal cavernous tissue to a strong chilling of the skin or irritation of the air passages by dust. But characteristic of the "irritable nose" is the fact that the response occurs so readily and on provocation insufficient to produce any engorgement of the blood-vessels of a healthy nose. Yet some patients who possess a well characterized "irritable nose" pay so little attention to the local annoyance that only a close examination will point out the nose as the starting-point of the more prominent eye symptoms, and all that can be elicited is the fact that any slight irritation causes a little stuffiness of the nose without much discomfort. But these forms of trouble are curable by nasal treatment as well as the more severe cases.

---

[1] See discussion before the Berliner med. Gesellschaft, in *Berl. klin. Wochenschrift*, Nos. 3 and 4, 1887.

In other instances, however, there is a good deal of unpleasantness produced by the frequent attacks of "cold in the head," which may last only a few minutes or hours, or be prolonged into an attack of genuine coryza, persisting for days or weeks. Hack's reasons for holding the vascular engorgement responsible for the production of nasal reflex neuroses were the following: Whenever these nasal reflexes occur in a paroxysmal form, as in migraine, asthma, and similar instances, they are always preceded by an irritable and stuffy condition of the nose. Such paroxysms could in some cases be experimentally provoked by touching the nasal membrane with a probe and inducing thereby engorgement of the cavernous tissue. On the other hand, a cure of such nasal reflexes could be obtained in most instances by Hack by means of galvano-caustic obliteration of the sub-mucous cavernous tissue, and indeed in a number of instances the success of the operation was only insured by cauterization repeated until the vascular tissue had been entirely destroyed, while the nose was not treated otherwise. These statements I can corroborate in the main from my own experience.

I have observed, however, that the irritability of the nose depends in some instances upon the presence of some other lesion, the removal of which is followed by the disappearance of the distant reflexes as well as of the nasal annoyance. Polypi may play this role of primary factor, but in connection with ocular symptoms I have only seen one instance of polypi. More commonly a catarrhal inflammation of the nares, especially of the upper and middle meatus, maintains the irritability of the cavernous tissue. The diagnosis depends on the redness and often the succulent condition of the mucous membrane, to which flakes of mucus adhere. In these instances nitrate of silver has proven a satisfactory remedy in my hands. I use a 4 % spray once in one or two days, generally preceded by a spray of cocaine (2 % solution) on account of the greater comfort to the patient. Where there is much discharge it is better to remove it previously by means of a douche of bicarbonate of soda solution or the syringing with a post-nasal syringe. In favorable cases the symptoms are relieved by the first application, and in some ten to twenty days a cure can be expected. But if any evidence of irritability of the nose remains, relapses must be feared unless the cavernous tissue is destroyed.

In those cases where no cause can be detected maintaining the nasal irritability, the only means of relieving consists in the destruction of the cavernous tissue, wherever it can be detected by the probe. When the vascular tissue is not very much enlarged, chromic acid can be employed. This caustic, melted on a probe, is not painful after the use of pledgets of cotton saturated in a five-per-cent solution of cocaine. Sometimes, but not often, neuralgic pains in the neighborhood follow its use for some hours. It can be easily applied with strict localization, and any excess is then removed by a gentle current of bicarbonate of soda solution. But since chromic acid does not destroy the tissue very deeply, there is always some erectile tissue left, and relapses are to be expected.

More thorough in its action is the galvano-cautery. With a ten-per-cent solution of cocaine applied fifteen minutes previously, there need be no pain. The nares should be well opened by a wire speculum, I have generally used a flat spatula-shaped burner, searing the region first with its flat surface, and then burning deep furrows with its edge. A strong current is needed to make it effective. Even in this case erectile tissue will sometimes grow again, and may need a second destructive operation. There is often a good deal of lachrymation and ciliary injection produced in the eye of the operated side for some hours. Beyond pain, however, I have never seen any ill consequences from cauterizing the cavernous nasal tissue. The eschar becomes detached in the course of some four or five days, and may be gently removed with forceps. The healing of the wound is favored by keeping the nose plugged with cotton. As soon as the traumatic swelling has disappeared, within about a week, the other side of the nose may be attacked.

The majority of cases of irritable nose can be successfully treated according to the plan described. There were, however occasional instances where I have only been able to mitigate the nasal symptoms. In such patients, usually of a distinctly neurasthenic type, the cavernous tissue forms again after an apparently thorough destruction, sometimes in new places, and relapses of the nasal annoyance recur after a while. Ocular symptoms, however, I have found on the whole to disappear pretty readily, even when the nose still showed a morbid irritability.

3. Another type of ocular disturbances, also characterized by *discomfort* and *itching of the lids*, I have previously described in the *American Journal of Medical Sciences*, April, 1886. The peculiarity of these cases was their periodicity. The trouble began between May and July every year, and terminated promptly with the first cold days of fall. This periodicity led me to consider these cases as allied to, if not identical with, hay-fever. My paper was based on the records of four cases, none of whom had characteristic hay-

fever symptoms of the nose originally, though in one of them some signs of that disease became more recognizable later on. I have since seen another instance where the other symptoms of hay-fever were more developed. During the course of this affection, however, there is formed gradually a peculiar conjunctival lesion. It appears at first as slight follicular enlargement, but amounts ultimately to the formation of large, flat, yellowish follicular granules, accompanied by only moderate catarrh of the conjunctiva. These lesions, as well as all other symptoms of the disorder, disappear completely during winter. This disease I was not able to cure in any manner whatever. The last patient, whom I have seen since my first communication, has been treated by several oculists for trachoma, without the least benefit during the warm season.

I cannot furnish any absolute proof that this type of conjunctival disease is of nasal origin, but various considerations render such a view plausible. Our therapeutic resources, upon which we can rely with a good deal of certainty in all idiopathic conjunctival diseases, were entirely useless in this affection, although the transitory character of the lesion was shown by its disappearance during winter. The subjective annoyance of intense itching was much more marked than in ordinary conjunctival diseases, while this very symptom is a prominent feature of asthenopia of nasal origin. It is true, however, that in three of my patients neither nasal annoyance nor objective nasal alterations could be found. But, as I have previously remarked, an "irritable nose" may give rise to very little local discomfort. Indeed the only objective change to be looked for in moderate hay-fever is the enlargement of the cavernous tissue, and this varies within wide limits. One of my patients has really developed nasal and pharyngeal irritation during the hay-fever season, while the last (undescribed) case I have seen had quite a distinct history of a very slight degree of hay-fever (which had not been recognized) and showed the characteristic vascular enlargement and irritability of the nose.

4. A somewhat different type of symptoms results in those instances in which there is less itching of the eye-

lids, while *photophobia* is more prominent, with or without *ocular pain.* Often such eyes are somewhat *bloodshot.* Cases in which the photophobia was severe enough to induce blepharospasm, as reported by Bettman, have never come under my observation. With this group of symptoms there may be more or less asthenopic complaint and lachrymation. According to my experience photophobia and burning and smarting pain in the eyes, or even aching, have occurred, with extremely little nasal annoyance, although the successful treatment proved the nasal origin of the ocular symptoms. On the other hand, itching of the lids was generally associated with decided nasal discomfort (except in the periodic cases described in section 3).

5. In other patients in whom these subjective symptoms may be more or less marked an *injection of the pericorneal vessels* is *the most* prominent objective complaint. The eyes are bloodshot, either continuously or more especially in the morning. The hyperæmia pertains more to the superficial vessels, but the deeper radiating ciliary blood-channels may also participate, especially when the eye is irritated by any slight manipulation. There may be slight ciliary tenderness but absolutely no evidence of any intra-ocular inflammation. In two instances under my notice grave fears had been aroused as to the possibility of this irritation indicating sympathetic disease, since one eye had previously been injured. But the cessation of the redness and eye disturbance after cauterization of the nose settled the diagnosis. This form of ocular trouble is generally of a chronic, persistent character, but sometimes occurs in the form of separate attacks, especially in the morning. I have, however, observed an acute case of ciliary irritation, which seemed to be attributable to nasal influence.

I. B., twenty-nine years old, has never complained of his eyes until within the last week. The eyes have become sore for about seven days, feel heavy and burn, but can scarcely be said to ache. There is frequent supra-orbital headache. He has had a "cold in the head" since or just before the eye trouble began. His nose is obstructed and discharges a small amount of pus. There is intense subconjunctival pericorneal injection, principally of the superficial vessels, although the deep ones are also visible. The injection diminishes towards the retrotarsal folds, and the palbebral conjunctiva is not congested at all. There is no conjunctival secretion. The intra-ocular tension is normal, but the ciliary region is slightly tender to pressure. The movements of the pupils are normal. No anomaly whatever can be found in the cornea or its limbus, the iris, or the intra-ocular tissues. The vision, R E = $\frac{20}{50}$, and L E = $\frac{20}{60}$, corresponds to a slight astigmatism and is not affected by his disease. The nasal mucous membrane is congested as well as the submucous cavernous tissue, and flakes of puriform mucus adhere to the surface. The inflammation extends to the roof of the naso-pharyngeal space, but does not involve the pharynx itself.

I was not able to recognize any ocular disease, and could not but consider the eye trouble as a vaso-motor neurosis, due to the acute nasal catarrh. Accordingly I sprayed the nose with cocaine, washed it out with a bicarbonate of soda solution, and applied the spray of nitrate of silver. This treatment gave him decided relief at once, both of the fulness of the head and the ocular discomfort. On account of his headache I prescribed salicylate of soda, one gram every four hours. This drug controlled his pain satisfactorily. A steady improvement of the discomfort, as well as in the appearance of the eye, began, and the nasal treatment being repeated every second day, he was entirely restored within ten days. The subjective relief of the ocular symptoms was so marked after every nasal application that the case seems to me one of nasal origin.

6. Sudden *congestion of the lids*, varying from an *erysipelatoid* condition to a mere *superficial erythema*, is not a rare occurrence in patients with irritable noses. Hack was the first to call attention to the sudden onset of redness and swelling of the lids, especially the lower one, occasionally observed in such patients. The attack resembles genuine erysipelas; but, unlike the latter, it does not spread, and is not accompanied by any, or, at the most, by but a very slight rise of temperature. It may last from two to six days, and is followed by more or less desquamation. It may be mistaken for a phlegmon, originating from the lachrymal duct. But in the three instances which I have

seen there was no inflammatory condition of the tear passage. After its first occurrence it is apt to return at intervals of months or years. The subjective complaint is that of fulness and itching without much pain. My patients gave the history of an irritable nose in every case, with especial irritation before the pseudo-erysipelas began. For various reasons the nose was not cauterized, and I have subsequently lost track of the patients. Hack, however, gives several instances in which attacks occurred at repeated intervals, to cease permanently after cauterization of the nose, while in some cases a similar attack followed immediately on cauterizing the irritable zone. Our pathological knowledge is not precise enough to give a satisfactory explanation of the pathogenesis of this lesion. Occurring, however, as it does, without traceable local cause, developing all at once, and once established receding without ever being progressive, it may be interpreted as a vascular disturbance, allied to inflammatory œdema, and depending on nervous influence rather than on any local infection. That these nervous influences start from the nose was in my cases only a plausible inference, in view of the irritability of the nose and the aggravation of nasal symptoms preceding the erysipelatoid attack. This inference is put on a more solid basis by the more extended experience of Hack, both by producing this condition by the therapeutic irritation of the nose, and by preventing its subsequent recurrence by the treatment.

More frequent than erysipelatoid swelling are attacks of superficial congestion of the skin of the lids in patients with irritable noses. The color of the skin in these instances is not light red, but rather dusky. There may be little if any swelling. The skin, however, looks roughened. Usually there is a good deal of itching complained of by the patient. Generally some little desquamation follows the attack. The attack may last only a few days, or may persist in a mild degree indefinitely. Sometimes a similar appearance is also found in hay-fever. In three instances where these attacks returned frequently or persisted they were definitely stopped by nasal cauterization. I have seen a larger number of cases of this kind, but have not treated the nose in the others.

7. In other instances vaso-motor reflexes occur in the form of *sudden œdema of the lids.* There may be no congestion whatever, while in some other cases the appearance resembles that of urticaria. The attacks last only a few hours, or, at the most, not over one day.

This array of symptoms, arranged in the groups in which I have found them most commonly combined, comprises those ocular disturbances which I think can be definitely referred to a nasal origin. My proofs are the successful results of nasal treatment in many instances, and the continued observation of the symptoms in others suffering from "irritable noses," showing dependence of the one upon the other. There are other forms of ocular annoyance in which my experience has led me to suspect a nasal origin, of which, however, I still lack definite proof. Amongst them I may mention scotoma scintillans (blind headache) and chorea of the ocular muscles and muscles of the lids.

Besides, I have seen a fair number of instances in which nasal irritability appeared to prolong idiopathic disease of the eye. This relation has occurred to me more often in blepharitis and in phlyctenular conjunctivitis than in any other form of eye disease. It is well known how frequently subacute nasal catarrh accompanies the phlyctenulæ of scrofulous children. Protracted cases have often seemed to me to start on a more rapid course towards recovery as soon as I began to pay attention to the nose; still such observations are to be regarded more as a matter of subjective impression than as a definite conclusion.

The diagnosis of the nasal origin of ocular symptoms is in the individual case, of course, a matter of theoretical inference, until proven by the result of treatment. I am in the habit of searching the eye objectively and functionally in every case, and of course do not look for an extra-ocular explanation of the symptoms until I am satisfied that there exists no ocular anomaly to account for them. The history of the patient as to the condition of his nose is then consulted. It must be remembered that some persons with "irritable nose" do not pay much attention to the local discomfort. On the other hand, nasal disease may coexist without being responsible for the eye trouble. Irritation of the erectile surface of the nose with a probe may throw some light on the matter. In irritable noses it causes ciliary irritation and injection of the eye of the same side. But to this test there are exceptions, both in the positive and the negative way. A nasal origin is also more likely if itching is present and if the symptoms are worse in the morning. If further inquiry does not show any other extra-ocular condition which can be considered as the probable cause of the eye trouble, and if the examination, repeated if necessary, proves an increased irritability of the nasal mucous surface, I propose the nasal treatment. The prognosis, which I formerly gave with considerable reserve, has become more certain as my familiarity with this relationship has increased. In the less-marked cases of asthenopia, however, especially in persons of a nervous type, the possibility that the asthenopia and nasal irritability are both symptoms of a disordered nervous state, but independent of each other, must be kept in view.

A NEW INSTRUMENT FOR TESTING INSUFFICIENCIES OF THE RECTI MUSCLES.

By WARD A. HOLDEN, A.M., M.D., Cincinnati, Ohio.

IN the normally muscled eye accommodation and convergence are correlative. A certain degree of accommodation is accompanied by a certain degree of convergence. But when there is an insufficiency of the internal recti muscles it is different. Here with a given amount of accommodation, the natural convergence is not sufficient to direct the visual axes of both eyes toward an object at the distance accommodated for. An extra convergence is necessary, and to produce it the internal recti muscles are subjected to a tiresome strain. The object of insufficiency tests is to find the difference between the natural spontaneous convergence and the necessary convergence for single vision.

Images which fall on corresponding points in the two retinæ are seen single. Images which fall on points not corresponding but near the corresponding points in the same horizontal line with them, are rapidly fused and seen single. This is so since the internal and external recti of the two eyes can act independently of each other, and by producing a greater or a less convergence, bring the two images upon corresponding points on the retinæ. Images which do not fall upon corresponding points in the two eyes, but one of which falls on a vertical line from the corresponding point, are not fused if the distance is at all great. This is so since the superior and inferior recti muscles in the two eyes have but little independent action.

When two points in a vertical line are allowed each to form an image on one eye of a pair with balanced muscles, the two images fall upon corresponding vertical lines in the two retinæ. And when the two images are projected forward from the eyes, they appear in a vertical line. This is the case where the pair of eyes have balanced muscles. When there is an insufficiency, the result is not the same. If with an insufficiency two points in a vertical line as before are allowed each to form an image on one eye, the two images are seen, of course, one above the other. But as the two images are not in a horizontal line they cannot be fused by muscular effort. And since they cannot be fused, the internal recti produce only the natural convergence that corresponds to the amount of accommodation used. The extra convergence, the strain necessary for single vision, is not employed. Consequently the visual axes do not strike the objects observed, but diverge. And if corresponding vertical lines be drawn through the two maculæ, the image in one eye falls in the line, and the image in the other eye falls outside the corresponding line. And these two images projected forward appear oblique. We test insufficiency then by having two objects in a vertical line so arranged that each forms an image on one retina, and then measuring the angular horizontal distance between the two projected images, or finding the prism that will bring the two into a vertical line.

The test that first suggests itself is performed with two distant lights in a vertical line, some little distance apart. A screen is necessary, so that each light may be seen by but one eye. We may take the ordinary screen of the stereoscope, which is a short board with a cross-piece on the distant end. When the screen is held between the eyes with the near end of the board vertical, as in the stereoscope, it cuts off the internal part of the visual field in both eyes. When the screen is inclined so that the near end of the board is 45° from the vertical, it cuts off the upper and internal field of one eye and the lower and internal field of the other eye. So when the lights are looked at with the screen tilted, one light is seen by each eye. If the eyes are normally muscled, the lights appear in a vertical line. If there is an insufficiency, the lights appear oblique, and may be brought to a vertical line by prisms. To simplify this test, in practice a vertical prism is used before one eye with a single light in the distance, and this has the same effect as the two lights with the screen. But the first test may be made much the simpler of the two, as prisms may be dispensed with altogether. If instead of the two lights a vertical line is taken and the screen used, when the muscles are normal the part of the line seen with one eye and the part seen with the other run into each other, and a single unbroken line appears. If there is an insufficiency, the two parts of the line appear as short vertical lines, one above the other, parallel, but a distance apart horizontally. The horizontal angular distance between the two measures the insufficiency.

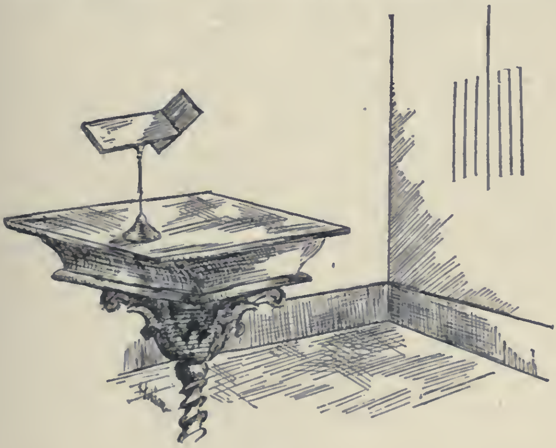


FIG. 1.

Let a long vertical line be drawn on a wall, and let short lines be drawn on each side of the long one, parallel to it, but reaching up only to its middle. Then when the screen is used one eye sees the upper half of the long line, and the other eye sees the lower half of the long line and the short lines. If there is no insufficiency, the upper part of the long line appears running into the lower part of the long line. If there is an insufficiency of either internal or external recti, the upper part of the long line appears running into one of the short lines. Knowing the distance of the wall from the eye, and the distance between the long line and that short line which appears continuous with it, the amount of insufficiency can be computed. If we take a wall 6 *m* distant, one degree of prismatic effect corresponds approximately to 5.2 *cm* of horizontal distance. If the short lines are placed 5.2 *cm* apart, their number will give the degree of prism required to correct the insufficiency. For convenience the long line may be made thicker than the rest, or the short lines may be of different colors.

In making the test for insufficiency for near objects, a board 35 *cm* in length (the ordinary distance for near work) may be placed with one end touching the face obliquely between the eyes, and the other end resting on the wall. The lines used are similar to those for the distance tests, a long one running above and below the board, and short ones running below. At 35 *cm* distance one degree of prismatic effect corresponds to 3.2 *mm* of lateral distance on the wall, and the lines should be placed this distance apart.

As the screen cuts off the inner and upper part of the field of vision of one eye, and the inner and lower part of the field in the other, tests for insufficiency of the superior and inferior recti may be made without changing the position of the screen. To do this, another set of lines similar to the vertical ones are drawn horizontal, and the vertical distance between them is considered.

This is the test by measuring the horizontal distance between the images. The test by bringing the images to a vertical line may be made in various ways. The ordinary method is by placing a strong prism vertical before one eye while a distant light is observed, and slipping a series of horizontal prisms before that. I have described an instrument which has a strong vertical prism for producing displacement of the image, and a rotating prism which serves the purpose of a series of horizontal prisms, and brings the displaced image to the vertical line.[1]

The vertical displacement and the lateral correction may however be made by a single glass. If a mirror is held horizontal, a little above one eye, a reflection of a distant light may be seen in the mirror, while a screen below cuts off the view of the object itself. The other eye will see the light, and with the two eyes will be seen two images, one above the other. The mirror has the same effect as the vertical prism, and if there is an insufficiency of either the internal or external recti, the images appear oblique, and the rotation of the mirror will bring them to a vertical line. When the mirror is tilted from side to side, the displaced image describes a curve. If it is rotated from a vertical position 180° to another vertical, the image describes a circle passing through the true position of the image. When the axis of rotation is tilted up from the horizontal, the image is displaced farther upward, and the circle described by the image during the rotation of the mirror is larger.

---

[1] ARCH. OF OPHTH., vol. xvi., No. 3, p. 295.

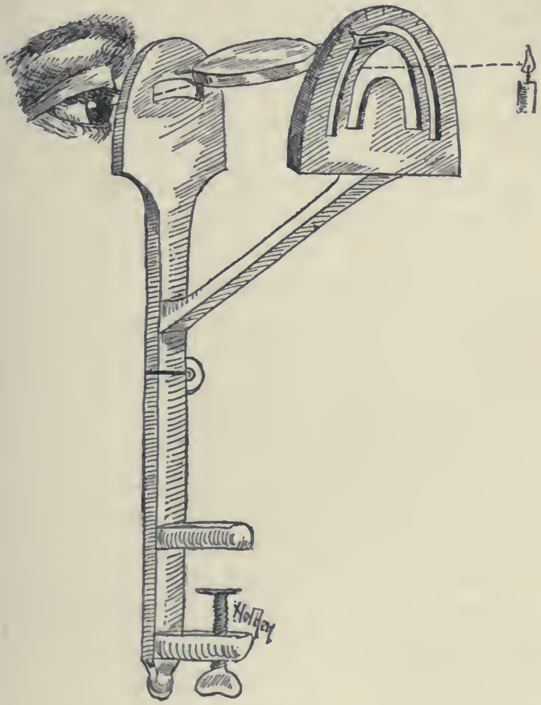


FIG. 2.

The axis of the mirror should be elevated until the image is displaced as much as a 14° prism would displace it, and then when the axis is directed exactly toward the light and the mirror rotated, the image will extend out laterally an equal distance to each side of the true position of the light. A scale may then be made on the stand of the instrument, and in a case of insufficiency, when the two images are brought to a vertical line by the rotation of the mirror, the degree of prism necessary to correct the insufficiency may be read off the scale. If the false image when projected on the wall 6 *m* distant stands 80 *cm* above the light when the scale is made, when the instrument is used it must be adjusted so that the image in its rotation reaches a point 80 *cm* above the light, and reaches a point on each side of the light 40 *cm* from it horizontally.

When the mirror does not rotate on a fixed axis, but one end of the axis describes a curve of a variable radius corresponding to the width and elevation of the mirror, the image instead of moving in a curve moves in a horizontal line. This double motion is easily secured by extending from one pole of the mirror two wires which slide in a curved slit. With this improvement it is much easier to get the correct elevation and direction of the axis of the mirror, since the image describes the horizontal line only when these are correctly arranged, and when either is wrong the image describes a curve. In testing insufficiency for near vision a dot on a card may be used. By having a hinge in the stand which can be turned 90°, insufficiencies of the superior and inferior muscles can also be tested.

After the instrument has once been adjusted it is probably the simplest means of testing insufficiency, and from its simplicity there is less liability to error than in any of the other tests.

THE ACTUAL CAUTERY IN THE REMOVAL OF NEOPLASMS FROM THE EYE, WITH A CASE.

By B. L. MILLIKIN, M.D.,

OPHTHALMIC AND AURAL SURGEON TO CHARITY HOSPITAL, ETC., CLEVELAND, O.

MUCH of late has been said upon the use of the actual cautery in eye surgery, particularly upon its use in the treatment of various kinds of ulcers, etc., but I can now recall only a single instance of the recommendation of its employment in the extirpation of new growths upon the eyeball. In all growths of a malignant nature of course the important thing is the removal *in toto* of the diseased tissue, and it matters little what may be the *modus operandi* so that the destruction of the new formation be effectual and complete. In affections of the conjunctiva, without attachment to the underlying sclera, all growths can be easily and effectually removed with scissors, but when the cornea is attacked neither the scissors nor the knife can be employed with most advantage, on account of the difficulty of judging just how much of the tissue should be removed and of controlling the instrument. With the cautery, however, we are better able to confine its action to the limits desired.

The following case has been of so much interest to myself, on account of the somewhat rare occurrence of the disease, and the good results from treatment, and so nicely illustrates the effect of this surgical procedure, that I venture to report it somewhat in detail.

I first saw the patient on the 2d of May, 1885, when I obtained the following history :

J. M., æt. seventy-two, farmer, was always healthy with the exception of a little rheumatism, and, at the time, was a well-preserved man for one of his years. He states that twenty years ago he had something removed from the right eye, probably a pterygium, from the history he gave, but the eye has remained perfectly well until recently. Six months ago he first noticed a small growth on the right eye, at the corneo-scleral junction, directly inward from pupil, which during the past three months has grown quite rapidly. Has never had any pain or discomfort until recently, when the growth has extended so far upon the cornea as to cut off somewhat the field of vision internally. At present his general health is good. On the right eye at the corneo-scleral junction is a large, flat, warty-like growth, pinkish in color, nearly as large in diameter as a three-cent piece. It is located on the inner aspect of the eye and is attached to the conjunctiva and cornea. Upon the conjunctival side it rolls outward over the conjunctiva and has a somewhat restricted or peduncular base, but is strongly attached to the cornea, gradually creeping up along the corneal epithelium towards the centre of this membrane. In its flattened condition it extends about half way from the cornea to the inner canthus, but the attachment to the conjunctiva is much less extensive. It covers fully one third of the diameter of the cornea in its horizontal meridian. Large vessels run from this toward the conjunctival periphery.

For its removal a 4-per-cent. solution of cocaine was used, the instillations being made at intervals of ten minutes. The conjunctival portion of the growth was removed with scissors, the incision being carried well beyond the diseased tissue, and the corneal portion was detached by seizing the growth with forceps and tearing the whole loose with a strabismus hook introduced from the conjunctival side under the growth and pulling this forward and outward. By this means the cornea was quite freely cleansed of the diseased tissue, except in isolated spots. These were carefully removed subsequently by scraping the cornea with a Beers knife. The large crescentic conjunctival wound remaining was covered by dividing the conjunctiva clear down to the caruncle with a pair of straight sharp-pointed scissors, the flaps freely loosened on either side of this and brought together at the corneal border and secured by means of three or four sutures. The eye was freely washed with a solution of bichloride of mercury and a compress and bandage applied.

As the patient could not remain directly under my observation, the operation having been done in the country, I ordered him a solution of boric acid, gr. xv to f ℥ i of aq. dest., to be used twice daily, and the compress and bandage to be continued for about a week, and then report. The patient, however, did not return for four weeks, when I found the wound had healed kindly, the sutures having fallen out by suppuration. At the junction of the cornea and conjunctiva, just below the edge of the old wound, was a small, elevated, suspicious-looking spot, and a small swelling in the conjunctiva farther in. The patient was directed to return shortly, but he did not return until the 8th of August following, over two months from the last visit. Examination then disclosed return of the growth at three points: 1st. Upon the edge of the cornea, directly inward, is a spot about 5 *mm* in diameter, and extending slightly upon the conjunctiva. It is very firmly attached to the cornea, so that it cannot be moved. 2d. Directly inward from this, in the line of the cicatrix, and about half-way between the cornea and the inner canthus, is a small knot or elevation upon the surface of the conjunctiva, which is freely movable over the sclera. This is about the size of a split pea. 3d. At the upper border of the cornea, slightly within the vertical meridian is developed another spot about 2.5 *mm* to 3 *mm* in diameter, strongly adherent to the cornea, but apparently not connected with the conjunctiva. Large vessels communicate freely with all these growths. There has been no pain at any time since the last visit.

Under three instillations of cocaine, at intervals of eight to ten minutes, I freely snipped out with scissors the whole thickness of the conjunctiva, with the overlying new growth, and with a Beers knife cut and scraped as much of the growth from the cornea as possible. I then heated a piece of wire to a white heat over a spirit-lamp, and thoroughly cauterized the base of all the growths, going beyond the diseased tissue, and burning quite deeply into the cornea. Notwithstanding the free use of cocaine, the pain from the cautery was quite severe. The wounds were freely washed with boric acid solution, and a compress and bandage applied. The patient was directed to wash the eye twice daily with the boric acid collyrium, and a gr. i. solution of eserine sulph. to be instilled likewise. He was also ordered an alterative mixture of hydrarg. bichlor., potass. iodid., and syr. sarsaparillæ comp. three times daily. When seen one week later the eye appeared to be quiet, the wounds in conjunctiva and cornea were filling up nicely, there was no ulceration, the vessels had diminished greatly in size and number, and there were no suspicious spots. The same treatment was continued and the patient requested to return soon. But not until the 23d of January, 1886, did he report, when it was found that the growth had redeveloped upon the cornea in the form of a thin, flat, fleshy-like body the size of a split pea, just within the corneo-scleral junction. The conjunctival cicatrix was perfectly healthy in appearance, and there was no indication of the disease upon other portions of the cornea. Again, under cocaine, I scraped the growth away as much as possible with a knife and cauterized the base very freely with the heated wire, and directed treatment as before. The patient was seen again a month later, when the eye was doing well. In March, 1886, he was seen the last time, when the eye was entirely quiet, the redness and inflammation had completely subsided, and the cornea was very clear. The only symptoms which then indicated the ordeal through which the eye had passed, were the presence of several facets in the cornea, indicating the points where the cautery had been applied, and a slight ectropion of the internal portion of the lower eyelid, due to the cicatricial contraction of the conjunctiva. The vision was almost perfect and the patient suffered no inconvenience whatever.

Indirectly I have heard from this case several times since, and there has been thus far no redevelopment of the disease, although it is now nearly two years since the last operation. That the growth was of an epitheliomatous character, both the history of the case and the microscope give unmistakable evidence, and I have no doubt if it had not been removed it would have rapidly developed its malignant tendencies.

The cautery used was simply a bit of iron wire heated to a white heat. The paquelin or galvano-cautery would either of them have been more elegant and convenient, but the result could have been no more favorable. The means for the removal of neoplasms, from the corneal tissue particularly, is a matter of no little importance, and in looking up the subject I have found but a single instance where the cautery has been advised for this purpose. Most authors say nothing about the methods of removal. Arlt[1] has advised the use of the spoon for scraping away the diseased tissue, while Galezowski[2] alone recommends the use of the thermo-cautery. Nieden[3] in a report on the use of the galvano-cautery in a series of two hundred cases for various diseases of the cornea, does not mention an instance of its employment in a case of a new growth, nor can I find any other reference in the limited amount of literature at my command. The advantages of the thermo-cautery are: the convenience and ease of manipulation, the rapidity and thoroughness with which it may be used, and the slight inflammatory reaction and opacities following its employment upon the cornea.

A few words with reference to the use of cocaine in this connection may not be out of place. With the free use of a 4-per-cent. solution the pain in this operation was not great, but still it was very perceptible. The great advantage from cocaine seems to be the obtunding of the superficial sensibilities of the cornea and conjunctiva; and this is the most important consideration, for operations on the deeper structures of the eyes are not, as a rule, particularly painful. A strabismus operation, even in a child, is borne without great complaint, while touching the cornea or seizing the conjunctiva, without the cocaine, with fixation forceps, is exquisitely painful. Recently I did an enucleation, in the case of a man with marked lung disease, with three or four instillations of a 4-per-cent. solution of cocaine, and the pain complained of was only moderate, yet I have no idea that the cocaine affected in one way or the other the sensibility of the deeper structures cut through. Undoubtedly deep injections of the solution would further obtund the sensibilities, but I have not found this necessary, as I am able to do such operations as strabotomy, advancing the recti muscles, etc., without producing pronounced pain.

---

[1] "Diseases of the Eye," Am. ed , p. 114.

[2] "Diagnostic et Traitement des Affections Oculaires," 1883, p. 111, by Galezowski et Daguenet.

[3] ARCHIVES OF OPHTHAL., 1885, p. 31 *et seq.*, and p. 455 *et seq.*

ON THE CONNECTION BETWEEN DISEASES OF THE EYE AND NOSE.

By Dr. ADOLPH NIEDEN, of Bochum.

Translated and abridged by Dr. J. A. Spalding, of Portland, Me.

ALTHOUGH the connection between the apparatus of sight and smell and their adjacent cavities is so intimate, yet little attention has, so far, been paid to their mutual relations.

Various authors have from time to time mentioned the connection between coryza and conjunctivitis, and urged the presence of nasal catarrh as one of the exciting causes of dacryo-cystitis, but no mention has ever been made of disturbance of the lachrymal duct as one of the causes of ozæna. To this question we will therefore return further along.

Bresgen[1] was the first to call the attention of specialists to the fact that conjunctival catarrh is largely dependent upon the so-called nasal catarrh, and that it will not disappear until the latter is relieved. The same author has again and more recently pointed[2] at this connection between two diseases, and he regards the connection between the stricture of the lachrymal duct and diseases of the nasal mucous membrane as so close[3] that he declares that every lachrymating patient, even when he first visits an ophthalmic surgeon, ought to be immediately referred to a rhinologist for a scientific examination, and for eventual treatment of the nose.

---

[1] "Der chronische Nasen- und Rachen-Catarrh," 1881, Band I.

[2] "Grundzüge einer Pathologie und Therapie des Nasen-, Mundrachen- und Kehlkopf-Krankheiten," 1884.

[3] Well known to ophthalmologists, and particularly dwelt upon by Arlt many years ago.—K.

Much as we may be disinclined to adopt this view, for every ophthalmic surgeon will, of course, turn his attention to the nasal termination of the lachrymal duct, if after close examination with probes he fails to find a stricture or contraction to account for the lachrymation, yet we should be thankful to the rhinologist for calling our attention to the much more important question of general asymmetry of the orbital and nasal region and cavities as one of the chief causes of anisometropia, so that now we can at last find some explanation for those difficult cases in which we were at loss to account for the existence of perplexing variations in the optical structure of the two eyes.

Let us now take a brief glance at the various affections in which the cause of the trouble in the eyes is due to a previous diseased condition of the nasal mucous membrane, or inversely.

And in this category we can only include such processes as are propagated by direct intermediation of the nasal portion of the lachrymal canal, and so introduce infectious inflammation of the neighboring lining membranes that are similarly constructed, or we may see *reflex processes* which, once excited by the nerves of the nasal mucous membrane, give rise to reflex sympathetic affections in the eye and its neighborhood.

In point of fact, so far as the *first method of transmission* is concerned, the anatomical relations of the direct connection of the epithelium of one cavity with that of the other are the most favorable that could possibly be imagined. And further still, there is not only an indirect arterial connection between the orbit and the nose, through the anterior ethmoidal artery which, as a branch of the ophthalmic, nourishes the anterior portion of the septum and the lateral portion of the nasal cavities, but, as Zuckerkandl has shown, there is a direct arterial communication passing along the naso-lachrymal canal. So, too, the veins of the nasal cavities anastomose extensively with the ophthalmic vein through the plexus lacrimalis.

The reflex processes—*physiologically* exhibited by increased lachrymation on mechanically tickling the nasal mucous membrane, or inversely, forcible sneezing whenever the eyes of certain persons are dazzled with a flood of light; and *pathologically* witnessed in the removal of a foreign body from the cornea by an increased moisture of the nasal mucosa of the same side, which is produced not only through the lachrymal passages, but by the active sensation of warmth, and the secretion resulting from increased volume of blood to the part—the reflex processes, I repeat, depend upon the anatomical fact that both cavities are supplied by twigs of the first and second trigeminal branches of the naso-ciliary and spheno-palatine nerves. They can also be equally well explained by the associated action of the ciliary and rhinic ganglia.

Amongst the many interesting observations in this point of view we may cite that of Hack,[1] who saw a case of supraorbital neuralgia and scintillating scotoma due to chronic inflammatory swelling of the mucous membrane of the inferior turbinated bone.

It is very difficult when we see ozæna and disturbances in the lachrymal apparatus in the same person to decide which originated first, and yet I think that this decision is of the greatest importance if we wish to understand the mutual interdependence of these two affections of the nose and eyes.

I cannot get rid of the impression that the chronic inflammation of the nasal mucous membrane in which a thin secretion, instead of flowing off, dessicates upon the surface in the shape of brown or greenish crusts of dried mucus which easily decompose and originate the repulsive and characteristic odor and are additionally accompanied with atrophy of the underlying turbinated bones, is considerably influenced by the absence of the constant though slight moistening of the nasal passages normally excited by every motion of the eyelids.

Although it may be replied, as has already been done by several authors, that this part of the secretion can only represent a minimum, because by far the greatest portion of the constant outpour of the lachrymal gland is dried up within the conjunctival sac or upon the surface of the eyeball, yet even this minimum is quite sufficient to make its absence felt by any patient. Thus, almost every one who comes for advice in the early stage of a lachrymal affection, and who has paid even the slightest attention to his symptoms, complains of his own accord, or at all events when asked, of the simultaneous observation of the obstruction to the tears, and of a disagreeable sensation in one nostril, exhibiting itself in tickling, or irritation, or a distressing fulness, or tension. And if we examine rhinoscopically, we see this condition mirrored in an absence of the glittering surface of the mucous membrane, although there is as yet no trace of any disease.

---

[1] "Erfahrungen aus dem Gebiete der Nasenkrankheiten," Bergmann, Wiesbaden, 1884, page 36.

My opinion of the mutual relations of ozæna and epiphora is that, although a simple chronic inflammation of the Schneiderian membrane with its sequences at the nasal orifice of the lachrymal duct may be the original cause of the lachrymation, yet I think that the development of the chronic rhinitis into an ozæna is largely due to the absence of this regular lachrymal secretion, so that the mucous secretion sooner dessicates upon the nasal mucous membrane, then decomposes, and finally yields to fermentative alterations.

This, too, seems to me the only way of explaining those cases so obscure to the rhinologist, in which despite every symptom of dry catarrh no ozæna is excited, simply because there has never been any lachrymal affection to react upon the nasal mucous membrane.

There is no doubt that the products of ozæna exercise a directly noxious influence upon *affections of the cornea*, for we invariably expect suppurating ulcers with the characteristic infectious symptoms from extension of the disease, whenever ozæna is present in cases of traumatism even of the epithelium of the cornea, and this even when there has never been any blennorrhœa of the lachrymal sac, which of itself is quite sufficient to excite the infection.

We see still further the fact admitted by all ophthalmic surgeons, that another form of infectious disease, *phlyctenular keratitis*, almost invariably has its origin in a disease of the nose. Here we see in the preliminary stage more or less swelling, redness, increased secretion, and the formation of ulcers around the edges of the nostrils. The upper lip participates in the process of infiltration and begins to swell. The nose too as a whole tumefies, becomes red, the thickening of the mucous membrane extends well into the posterior portion of the nose, and hemorrhage follows even a gentle touch with the probe. The margins of the nostrils are covered with dry, hard crusts, which, when removed, reveal a more or less deep, excoriated, ulcerated, and bleeding surface.

If it is asserted that all this is merely *post hoc, ergo propter hoc*, and that this complication can be much more simply explained as a "*scrofulous*" symptom which may manifest itself equally upon one as upon another mucous membrane, there is nevertheless no doubt that the trouble with the eyes can only be permanently and certainly relieved when simultaneously the pathological condition of the diseased mucous membrane of the nose has been treated and restored to its normal state.

It is therefore my opinion that the coincidence of the so-called scrofulous pustular inflammations of the mucous membrane of the nose and eye is not simply due to the constitutional anomaly, and I prefer to regard the disease of the eye as caused by that of the nose, just as in my practice I invariably treat the two side by side.

Furthermore, I would add that from my own observation there are many cases of *asthenopia* with inability to use the eyes for any great length of time, with symptoms of dazzling, and inability to fix objects, and for which with entire absence of all pathological alterations in the eyes, or of other visible causes, we can find no other rational reason than a chronic nasal catarrh; whilst finally all the asthenopic disturbances disappear when the nasal disease is relieved.

The following four cases do not exhibit such every-day scenes as have been suggested above, but they will, I hope, demonstrate in a forcible manner the innate connection between diseases of the nose and eye, and thus prove of some interest to the profession generally.

CASE I.—*Polypus starting from the upper portion of the nostrils, first perforating the median left and then the right orbital wall; bilateral exophthalmus; death under cerebral symptoms.*

Madame V., August, 1874, diplopia for several weeks, causing disagreeable vertigo; age fifty-eight, and always well till lately; occasional asthmatic attacks, but no affection of lungs. It is plain from her external appearance that nasal respiration is impeded. No headache. The left eye is pushed forward and deviates also outward and downward. Mobility but slightly affected inward and upward; vision normal, as well as the refracting media and fundus. Right eye normal. Diplopia.

The left eye cannot be pushed back into the orbit; no pulsation, but on attempting to push it back a distinct resistance is perceived in the inner and upper angle of the orbit in the shape of a tumor attached to the bone; it is rather jelly-like, but not fluctuating, nor can it be pushed back; it fills the entire inner orbital wall.

Examination of the left nostril shows a reddish soft and easily bleeding polypus filling the entire antrum, and extending to the lower margin of the middle turbinated bone. The surface is covered with secretion. Nasal septum deviates to the right. The growth apparently extends downward into the naso-pharyngeal space, because the air communication of the left nostril is entirely cut off.

There had been a disagreeable feeling of fulness for two years before in the left nostril, as well as a dull pressure in the forehead over the left eye. Lately, pain had become intense at the inner side of the bridge of the nose, and a feeling of pressure, then finally diplopia and vertigo, whereupon the fulness had disappeared.

The case was evidently one of polypus of the left nostril, starting from the highest portion of the cavity, gradually extending downward and backward, and, after filling the cavity, bursting through into the orbit at the spot of least resistance, where it rapidly increased in size.

From the slow growth of the tumor, its external appearance, the freedom from hereditary taint, I diagnosticated a benignant neoplasm, arising from the mucosa of the ethmoid plate, penetrating the lining membrane of the left orbit by pressure, then proliferating into the cellular connective tissue of the orbit and so dislocating the left eye.

As the prognosis appeared relatively favorable, I advised an early removal of the polypus, which I thought could be easily done by separating and bending back the nasal bones. I hoped also in this way to obtain access to the orbital cavity, and thus to free it from the tumor.

Unfortunately the patient would not consent, and I did not see her again till July, 1875, when the condition of things had greatly altered. The left eyeball was now pushed far out of the orbit, overrun with veins, and the cornea was xerotic, owing to lack of proper protection by the lids. The right eye, too, was now deviated just as the left had been before, whilst its mobility outward and downward was extremely limited.

The patient was chachectic ; nasal breathing suspended ; sight of the left eye totally extinguished for months. The ophthalmoscope revealed optic atrophy on this side, presumably due to exudation. The pupil was rigid and of medium diameter.

The sight of this eye had gradually decreased, and with it the diplopia. An intense headache had set in some time before and robbed her of sleep, gradually increasing in severity, and only improving with the reappearance of the former vertigo.

The patient had not noticed the obstruction of the right nostril nor the prominence of the right eye, and advice had only been summoned when the sight of this eye began to fail and the headaches once more resumed their terrible violence.

The surface of the tumor was ulcerated, and it hung down on both sides of the septum. The portion which had broken through the orbit was jelly-like and incompressible. The right eye was dislocated downward and outward, the contours of the papilla obscured, veins enlarged, arteries contracted, and the retina hazy. Vision much reduced, no defects in the field, and pupils reacting slowly. Enlarged maxillary glands. Large doses of morphine had been administered. No further cerebral symptoms.

The diagnosis was now clear. The former benignant tumor had become malignant, and was spreading rapidly in every direction. The vehement headaches seemed to indicate perforation of the ethmoid plate.

Fourteen days later, total loss of sight in the right eye without any further change in the papilla or retina. Simultaneous disturbances of consciousness ; enormous doses of morphia failed to procure sleep ; loss of appetite, then of digestive power ; keratomalacia. Death ended the scene in a few days.

It was impossible to obtain an autopsy.

Remarks.

Although no post-mortem examination could be obtained, there could be no doubt in regard to the diagnosis of the case. It was at first a simple polypus which had originated in the uppermost part of the nasal left cavity. After growing slowly but steadily downward, it perforated by its constant pressure the bony wall of the upper nasal cavity, and thus obtained free play for extensive proliferation within the cellular connective tissue behind the eye.

It then gradually pressed the eyeball out of its normal position, dislocated it to the left and downward, and thus excited the double images, with binocular vision.

The ever increasing propulsion of the eye and the simultaneous tearing and compression of the optic nerve stem and its central vessels must have excited disease within the optic nerve fibres, as exhibited at a later stage in the ophthalmoscopic image of the other eye. This was of course followed with atrophy and total amaurosis.

When the left eye had finally been dislocated as far as possible, it began to offer resistance to the unhindered growth and extension of the neoplasm, so that the latter was forced into another direction toward the right, where it soon, in a similar fashion, perforated the inner orbital wall and expanded itself as before on the right side in the loose retrobulbar connective tissue.

Here, too, the results as manifested in the eye were about as before : dislocation and subsequently disturbances in the function of the optic nerve fibres.

But on this side the ethmoid plate did not seem to have offered long resistance to the growing masses, since cerebral symptoms soon manifested themselves in increased force, and, under the form of terrible headache and disturbances of consciousness, terminated the patient's life in a state of coma.

In all probability this was at first a benignant neoplasm, which soon became malignant, although it did not outwardly vary in appearance from the common type of nasal mucous polypi.

The second case is of a similar nature, although it varied in its path of extension, and led simultaneously to an affection of both eyes.

CASE II.—*Myxo-sarcoma of the mucosa of the superior nasal sinus, rupture of the ethmoid plate, extension into the cranial cavity, and from there to the base of the brain and into both orbits ; neuro-retinitis, double exophthalmus, amaurosis, death in coma ; post-mortem examination.*

Paul G. consulted me October 14, 1884, for extreme loss of sight, coming on rapidly of late, causing total amaurosis right, and extensive loss of sight left.

Patient is so much affected mentally that no history can be obtained from him, but his wife says that a year ago he was perfectly well. Soon after their marriage, however, he snored so loudly that a physician was consulted, who in September, 1883, discovered a polypus in the right nostril, and removed it with the forceps, after which the snoring ceased.

In March the snoring began again, but, before a physician could be consulted, the patient one day sneezed from the right nostril a piece of polypus, which at once relieved the symptoms, though not so completely as after the scientific removal.

The nose was so much obstructed that the patient could only sleep with his mouth open, and, indeed, was generally in that condition all day long.

Repeated attempts at removal of the polypus were fruitless, owing to the abundant hemorrhage and violent pain ; small bits were, however, taken from the front surface of the tumor.

The last operation was in August, and was soon followed by total loss of smell, and violent headache, accompanied with nausea and vomiting.

Other attacks of sneezing resulted in the expulsion of bits of polypus from the right nostril, whilst the left nostril still remained partially free, so that with forcible inhalation a little air could be obtained through this side.

Increasing headache robbed him of sleep and strength, whilst the emesis prevented the introduction of much nourishment.

In October the sight began to be affected, and diplopia with vertigo set in. By the 12th the vision was entirely lost in the right eye; divergent strabismus. On the same day the sight of the left eye also became affected.

Patient is twenty-six years old, cachectic, considerable exophthalmus and deviation of the right eye, wide pupils, wavering left eye, and violent attempts at respiration, even with wide-opened mouth. He answers slowly, but clearly, and complains of the unendurable pain in the forehead.

The nose is filled with a livid red glittering gelatinous polypus, bleeding profusely to the touch of the probe; particles can be easily removed, and were microscopically examined.

Inspection of the pharynx shows that the entire naso-pharyngeal space is filled with the same tumor.

The right eye protrudes slightly from between the lid, turns a little to the right, but is immovable. Passive motion cannot be accomplished, nor can the eyeball be pushed backward into its normal position; no tumor can be felt with the fingers.

Conjunctiva injected, chemotic; cornea hazy; refractive media clear; optic papilla swollen; slight retinitis; sensibility of cornea abolished; and total loss of light-perception. T+1.

The left eye is less affected; globe covered with upper lid; lids can be voluntarily closed, but are open during sleep; the eyeball moves a trifle in all directions. Cornea and conjunctiva normal; slight anæsthesia of the former; pupil sluggish; refractive media transparent; neuro-retinitis. Vision slight, no central scotoma, normal field. T+1.

Patient has been deaf since youth, so that it is difficult to tell whether the increased deafness is due to the present affliction. Chronic thickening of both *Mtt*, and tubes closed by the neoplasm. The hearing has lately largely decreased, both for aërial and bone conduction, whilst loud tinnitus is present.

Slight facial paralysis right.

No other corporeal function affected. Temp. 38°.7 *Cent.* Urine normal, s. g. 1012.

The history and condition made the diagnosis plain; a polypus of the naso-pharyngeal space had filled both nostrils and the pharynx, then penetrated the cranial cavity through the ethmoid plate, and from thence had probably invaded the base of the brain as far as the optic nerve trunks, which it had then destroyed by pressure, and finally paralyzed the ocular muscles, either by direct entrance into their tissue or by acting upon the nerves that nourish them.

The only reason why the right eye was first affected was simply because the tumor had grown more rapidly upon that side.

Microscopic examination revealed myxo-sarcoma.

The prognosis was, of course, of the most despairing nature. Vision was entirely destroyed within a few days, and the patient lay stretched out unconscious upon his bed. The headache increased in severity from the first visit ; swallowing was difficult, and regurgitation frequent.

Partial relief was obtained by repeated morphia injections Four weeks later coma ensued, but death not till some days later.

Autopsy eighteen hours after death ; no difference in the position of the globes ; dura unattached to inner surface upon the left hemisphere ; beneath the dura a bit of bone, one-half inch in diameter, with ragged edges attached to the arachnoid.

Longitudinal sinus moderately full of blood ; on lifting the anterior frontal lobe of both hemispheres, a dark neoplasm was discovered. It seemed to be composed of mucous tissue, and was soft to the touch. Despite this softness, however, it had on the right side made a decided impression against the brain at the right anterior frontal lobe, and at one point extended into the brain substance proper, although it was here easy to shell out the mass from the brain tissue.

The tumor was smaller on the left side ; on elevating it still further, it was seen to be connected with a similar neoplasm, which extended into the nose through the ethmoid plate.

The tumor was also found closely united with the dura on the right side, and could not be separated without rupturing the continuity.

After this had been done, it was found that the tumor had entirely filled the right anterior cerebral fossa, and then extended across the crista of the ensiform process into the middle cerebral fossa, especially into the region of the foramen opticum, where it was closely adherent to the underlying dura. On the left side it had limited itself to the medium portion of the inferior anterior surface of the cerebrum, clung there as closely to the dura as on the right side, and on the anterior wall of the middle cerebral fossa exhibited simply a nut-like neoplasm, which extending from here to the optic canal, had then grown around the trunk of the optic nerves in the optic foramen.

The middle of the sella turcica was covered with the same neoplasm, which, firmly adherent to the dura, extended down to the medulla over the posterior edge of Bluminbach's declivity, and terminated in a ragged margin directly in front of the foramen occipitale.

After removal of the cerebrum, it was found that the tumor had been so closely adherent to the dura, and the latter so firmly united with the subjacent bone, that it could with only great difficulty be separated from the same. The bone was then seen to be rough, tinged with blood, and covered with a few granulations.

The inferior surface of the brain, from the olfactory bulbs to the superior border of the pons, was covered with the violet-colored, butter-like tumor, which bore the greatest resemblance to the structure in the nose and pharynx.

The destructive process had stopped short of the optic nerve trunks, which projected as white cords from the slimy, bloody mass.

The contours of the tuber cinereum, corpora mammillaria, and substantia perforata posterior could still be recognized.

The brain substance adjoining the tumor was softened; no line of demarcation between this and the normal portions.

The lamina cribrosa of the ethmoid entirely destroyed, and the bone macerated; the tumor looked just like that in the nose.

The two lateral walls, on the contrary, were still preserved, and both orbits entirely shut off from the nasal cavities.

The contents of the orbits were normal, although on the right side we found an almond-shaped tumor connected with the rest of the growth, having entered the cavity through the superior orbital fissure.

The tumor did not seem to have entered the orbit through the optic canal, though it was visible in that locality, without, however, having caused any effusion into, or thickening of, the nerve sheath.

On the contrary, all of the nerves entering the orbit through the superior orbital fissure were closely united with the neoplastic masses, their sheaths thickened and interwoven so that they could not be separated from the tumor. The nerves themselves were thinned, and resembled fine white threads.

This condition was less marked on the left side, and the nerve sheaths were not implicated in the neoplastic process. The tumor had conglomerated more around the optic nerve at the foramen and its sheath ; muscles and nerves well preserved, and no swelling of the optic nerve sheath.

None of the cranial nerves were affected, except the right trigeminus at its exit from the brain and in its course in the cranial cavity.

The Glasserian ganglion was imbedded in the tumor ; its afferent and efferent nerves and sheaths implicated in the neoplasm, and transformed as in the case of the ocular nerves.

Microscopic Examination.—The external appearance was so striking to the naked eye, that the diagnosis of a typical myxoma was easy. But this was barely confirmed by the microscope, for the pictures varied so much from what was expected, that the examiner had to assure himself that he was really examining the right specimen. This was due to the circumstance that the appearances of fresh myxomatous tissues vary extremely from those witnessed after the structure has been hardened in Müller's fluid and in alcohol.

The fresh examination of such jelly-like tumors fails to reveal any fibrillar system, which, on the contrary, is abundant after hardening. Thus, sections exhibited the muscles pressed apart from one another and from the optic nerve by a system of coarse mesh-work, which, in its turn, was interspersed with a finer reticulation.

The fibres could not have been mucin, because this does not precipitate in this shape in Müller's fluid or in alcohol.

There was no doubt that this mesh-work was œdematous connective tissue.

Fatty tissue was also discovered.

There were but few cell-forms other than those occurring in myxoma, so that the diagnosis of myxoma or myxo-fibroma could hardly be doubtful. Perhaps those portions adjoining the nasal region were richer in cells, in which case the tumor was a mixture of myxoma and sarcoma. But at all events the diagnosis of myxoma was justified, for, according to Koester, we can only speak of *œdematous* fibromata, sarcomata, and lipomata because the mucous tissue is identical with swollen connective tissue. And the other pathologists, except Virchow, assert that it is impossible to draw a sharp line between jelly-like œdematous fibromata and lipomata and what we style a myxoma.

The mucous tissue and collections of round cells which were observed microscopically in that portion of the polypus extracted from the nostril at an early stage, as well as the extreme rapidity of the growth, would seem to justify the diagnosis of a sarcoma.

Remarks.

This, then, is one of those rare cases in which a young person without hereditary taint suffers from a polypus in the right nostril, exhibiting at first the ordinary characteristics of a mucous polypus. The tumor relapsed after the operation and was again crushed. Although nasal breathing was restored immediately after the first operation, the second attempt was not so successful. Excessive hemorrhage followed; only a few fragments could be removed; and instead of obtaining easier inhalation, terrible headache started in the forehead. Obturation of the other nostril was soon observed, and the patient was compelled to breathe entirely through his mouth. No remission in the headache, sleep destroyed, and the patient's health was rapidly undermined.

Vomiting was the next symptom; next, loss of sight in the right eye; then more or less immobility of the right eye, first exhibiting itself in the form of diplopia, and then in a visible divergence.

A few days sufficed for the tumor to fill both nostrils and to extend into the naso-pharynx and interior of the skull, whereupon central vision of the left eye also suffered.

It would seem as if the headache after the second attempt at extraction meant that the tumor had not only extended downward but upward through the ethmoid plate. It was impossible to believe that the operation had injured this bone, for manipulation had to be abandoned early on account of the hemorrhage; and only a few fragments were removed.

The microscope revealed the characteristics of the myxosarcoma in the portions removed from the front of the tumor; and this diagnosis would account for the rapid growth.

It was not alone the nerves of smell that were destroyed, but the tumor must have groped along the base of the brain, and eventually affected the optic nerve, as well as the nerves that control the movements of the eyes, as was evident from the loss of sight on the right side and the paralysis of the motor oculi. Nor was the trigeminus spared, as the anæsthesia of different portions of the face demonstrated.

It was only when the tumor had deleteriously affected the nerves of all the muscles of the right eye, and the globe was totally paralyzed, that exophthalmus was observed.

The left eye was in turn affected; central vision blurred, and then a portion of the field. Opthalmoscope showed swollen papilla in both eyes, more advanced in the right.

Since the mobility of the left eye was less affected than that of the right, and the exophthalmus less but the amaurosis more rapid, we must conclude that the left optic nerve was the more seriously affected of the two.

All of these suppositions were confirmed by the autopsy, since the right portion of the tumor was more concentrated about the intracranial region of the optic and ocular nerves, then passed into the orbit through the superior orbital fissure, and on the left side chiefly affected the optic nerve, passing alongside it, compressing it on its course into the left orbit.

The subsequent cerebral disturbances which were finally followed by loss of consciousness prevented any further analysis of the separate symptoms of the extension of the intracranial process, and at last terminated the patient's life.

Although the clinical picture of the disease was easy to follow and to see confirmed at the autopsy, yet the diagnosis of the extension of the tumor in the right orbit was entirely at fault, because, in order to explain the enormous exophthalmus, I thought that the tumor must have extended largely within the orbit; but the autopsy revealed nothing but a small tumor in the right retrobulbar fatty tissue, whilst in the left orbit the tumor was hardly larger than a cherry-stone.

Here, then, we see precisely the same thing as in some cases of pulsating exophthalmus, in which there is no need of the actual presence of any mass in the rear of the orbit to dislocate the eyeball, and in which we see that other causes which prevent the exit of venous blood (such as are present in compression of the sinuses and *could also be confirmed in our case*) may be regarded as the essential exophthalmic elements.

CASE 3.—*Chronic empyema of the right frontal sinus and ethmoid labyrinth; rupture into the right orbit; dislocation of the eyeball outward; direct communication of the abscess with the nasal antrum.*

Mrs. F., æt fifty-four; diplopia and vertigo for several years, first excited by a tumor in the upper and inner corner of the orbit, and which, now enlarging, now diminishing, prevented the eye from moving to the left.

Chronic nasal catarrh for years, exacerbating with every cold, and accompanied of late with violent headache or a stifling feeling between the eyebrows.

Relief was only obtained by the abundant discharge of yellow secretion through the right nostril, and this the patient endeavored to increase by inhalation of warm vapors. She cannot tell precisely when the tumor and diplopia were first observed, but not suddenly, nor was their much pain; the general impression was of a gradual bulging with dislocation of the eyeball.

Health good, and headaches no longer trouble her very much since she has learned how to evacuate the tumor through the nostril as soon as it becomes full.

Facial expression very disagreeable, owing to the exophthalmus and dislocation of the eye; divergent strabismus. The first words that she utters show that the nasal cavity is obstructed; nasal respiration irregular, and voice nasal. Excoriations on the nostril from the exit of pus. Nasal breathing through the right nostril only possible after extreme exertion when the left is closed. Mucous membranes hypertrophic and covered with a yellowish, purulent exudation. The upper part of the right nasal cavity is apparently filled with secretion, whilst in the left there is only slight chronic rhinitis.

Elastic growth, at upper and inner wall of orbit, covered with normal skin, and as large as a walnut. Pressure causes it to diminish slowly in size, whilst on holding the head forward fluid escapes from the right nostril.

A quarter of an hour's pressure, without pain to the patient, sufficed to evacuate the tumor ; amount escaping, 20 *grm*. After this the patient felt relieved, but the globe did not resume its normal position, nor did the diplopia disappear ; tumor refilled in six hours.

Vision of right eye, visual field, and fundus normal, and the motion, except inward and upward and downward, extensive and free.

Left eye, normal ; no prominence over the frontal sinuses ; no pain on pressure ; no cerebral symptoms.

Diagnosis : Empyema of right frontal sinus or ethmoid labyrinth, due to chronic nasal catarrh, or a fresh attack of coryza, extending from the Schneiderian membrane to the lining membrane of the frontal sinuses. The gradual pressure of the pus, which only in a thinned condition could partially evacuate itself into the nose, had worn away the lateral wall of the sinus and penetrated into the orbit. Then the dull headache had ceased, since the penned-up pus could flow off into the more yielding retrobulbar connective tissue.

The exophthalmus indicated the presence of a tumor at the inner and upper margin of the orbit, and the subsequent propulsion of the eye outward showed that the abscess had extended into the orbit.

So, too, the inferior communication must have become more extensive, since, from the first, masses of pus could be easily evacuated through the nose by pressure.

This condition had lasted five years before I saw the patient, and she had grown so accustomed to it that she refused my proposal to heal the case radically by opening the abscess, and would consent only to treatment without operation.

The most careful use of douches, constant compression of the sac, application of all imaginable astringents, was useless, as might have been imagined from the chronicity of the case. The patient still remains, after six more years, in precisely the same condition as that in which I first saw her. Still the pus in the orbit is now enclosed in an enveloping membrane which hinders it from diffuse expansion into the retrobulbar connective tissue.

CASE 4.—*Diffuse hypertrophy of the nasal mucous membrane ; empyema of Highmore's antrum ; infra-orbital neuralgia ; right blepharospasm ; cure after evacuation and cleansing of the nasal and superior maxillary cavities.*

Mrs. G., æt. thirty-four, suffered from abdominal typhoid in the end of 1879. At the beginning of the fever the right nostril swelled and became obstructed.

Cerebral symptoms and partial loss of conciousness cause a break in the history, though during the entire fever she snored loudly.

After convalescence, a boring pain in the right upper jaw, pressure, and fulness in the cheek were perceived. As these increased, lachrymation of the right eye and inability to close it were observed.

When the pain increases, the lids open and close convulsively, until lately, when the neuralgia has become constant ; the blepharospasm has not ceased at all, and the patient has been unable to open the lids spontaneously.

The teeth feel dead and elongated.

The patient had previously been perfectly healthy.

She now seems of blooming health, but exhibits constant blepharospasm of the right side. The lids can be opened passively, and from between them flows an abundant stream of tears. Intense pain is perceived on touching the lower lid, and it extends down the right side of the face, where it is most acute. On opening the lids the eye flies upward, yet seems normal ; pupil reaction prompt, vision perfect, no field defect.

Spasm of the facial muscles is also noticed.

Pressure near the infra-orbital foramen causes violent pain, and the skin below is acutely sensitive.

Pressure upon the supra-orbital nerve reduces the pain, and, whilst continued, the patient can spontaneously open the eye for a short time. But when the pressure is relaxed the eyelids close once more.

Hypertrophy of the right nasal mucosa ; closure of the right nostril. Deeper in, polypoid enlargement of the mucosa. The surface of this tissue red, hard, yet easily bleeding.

Left nostril normal ; naso-pharynx normal.

Here we see a localized inflammation of the nasal mucous membrane as occasionally witnessed in the first stages of typhoid, gradually passing from acute swelling into general hypertrophy of the membrane, with partial polypoid degeneration of the surface upon the middle turbinated bone, so that it looked like a mulberry, though no genuine polypi could be seen.

This peculiar condition on the one hand, and on the other the unilateral development of the disease, and the excessive form of the reflex neurosis in the infra-orbital nerve, accompanied with boring pain in the right superior maxillary antrum, did not mislead me to diagnose simple hypertrophy of the mucosa, but the thought arose that here was perhaps a perichondritis. But as there were no objective symptoms of bone disease, I saw no reason to anticipate the latter complication.

The great point was to establish at once the patency of the right nostril, and as I had no galvano-cautery at hand, I scraped the turbinated bone and removed the hypertrophy with the sharp hook, which was easily done, though followed with abundant hemorrhage. This the patient endeavored to still by sniffing, and whilst violently attempting to direct the air through the right nostril, a large amount of offensive greenish-yellow thick pus was evacuated, so offensive that the patient and every one in the chamber began to vomit.

About 40 *ccm* of pus were finally evacuated, whilst simultaneously the pain in the right superior maxillary antrum ceased, and the eye could be spontaneously opened for a short time.

Inspection on the following day found the nasal mucous membrane less swollen, and an orifice upon the outer wall of the middle nasal aperture. Through this a sound was passed into Highmore's antrum.

Injections through the catheter with a syringe removed still more pus and debris of bone, and finally the cavity was entirely deodorized.

The facial neuralgia had ceased the night before, as well as the numbness in the teeth, and the patient could keep the eye open for a minute without a sign of blepharospasm.

The cure was soon complete by cleansing the cavity with disinfectants and astringents.

There is no doubt that the blepharospasm was excited by the condition of the nose, which in turn depended upon the rhinitis from typhoid fever. The mucous membrane of Highmore's antrum, with its purulent secretion, had then fallen into a morbid condition of stagnation and decomposition.

Which of the diseases excited the blepharospasm cannot be accurately decided from what we know of the history of the case. But it probably depended upon the secondary affection of Highmore's cave, because the walls of this cavity were compressed by the stagnating fluid within, and this condition resulted in tic douleureux, which, in its turn, was fully capable of exciting reflex processes in other nerve branches lying in direct connection with it.

A CONTRIBUTION TO TUBERCULOSIS OF THE EYE.

By DR. ERNEST NEESE, of Kiew, Russia.

Translated by Dr. James A. Spalding, Portland, Maine.

(*With plates xi. and xii. of vol. xvi.*)

WHILST I was staying at Heidelberg Prof. Dr. Becker was so kind as to hand me an eyeball whose condition when examined proved so interesting that it deserves publication.

The history of the case is that Mr. W., 33 years of age, was first seen August 2, 1882. The assistant physician reported that on July 21st he came for advice concerning pain in the eye.

"Media, slightly opaque; papilla, indistinct; vessels, moderately full.

"On the next day the opacity had increased; pupil round, and dilated easily with atropine; vitreous opacities, fundus veiled, *syphilis acknowledged.*

"Inunction treatment; condition, worse; pupil, irregular, moderately enlarged; fundus, invisible."

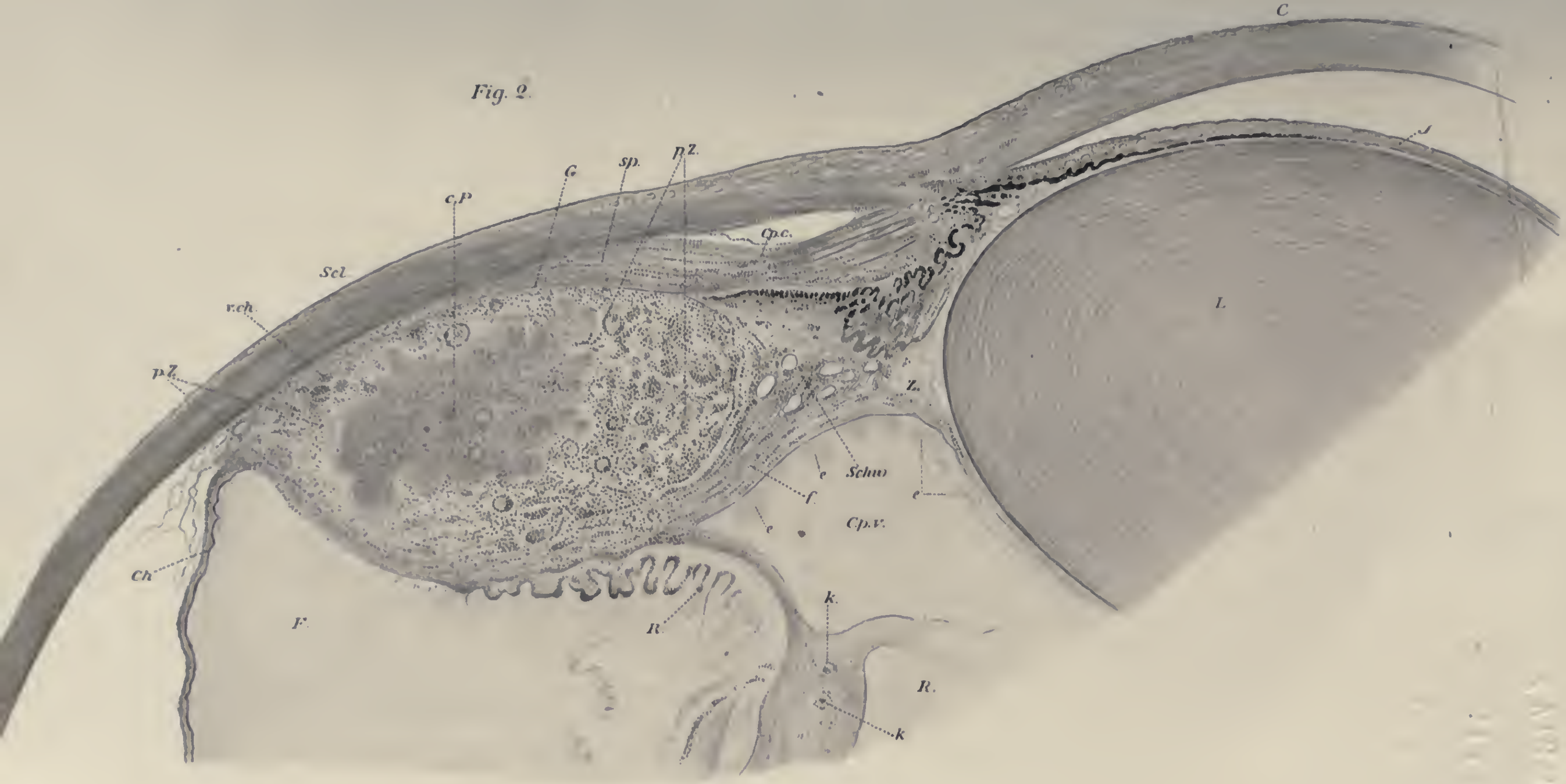
August 5th. Pupil enlarged.

August 7th. Treatment so far useless, except dilatation from atropine; only a trace of the fundus can be seen through the distorted pupil; opacities in the cornea; headaches, sleepless nights; potassic iodide.

August 10th. Headaches have ceased; eye, as before; T, normal; corneal opacity, worse.

August 12th. Corneal opacity has disappeared, and there are small grayish yellow particles in the anterior chamber.

Fig. 2.



Verlag v. J. F. Bergmann, Wiesbaden

Lith. Anst. v. C. K— Leipzig

[illegible]

Fig. 1.

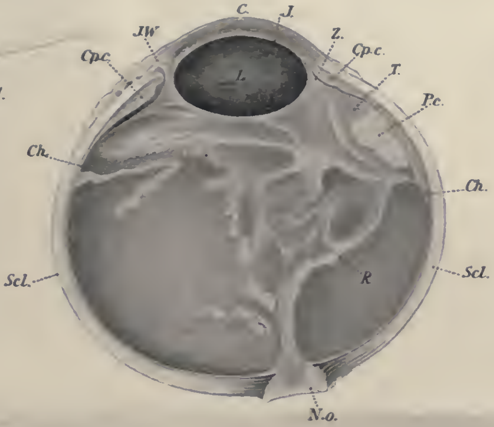


Fig. 3.

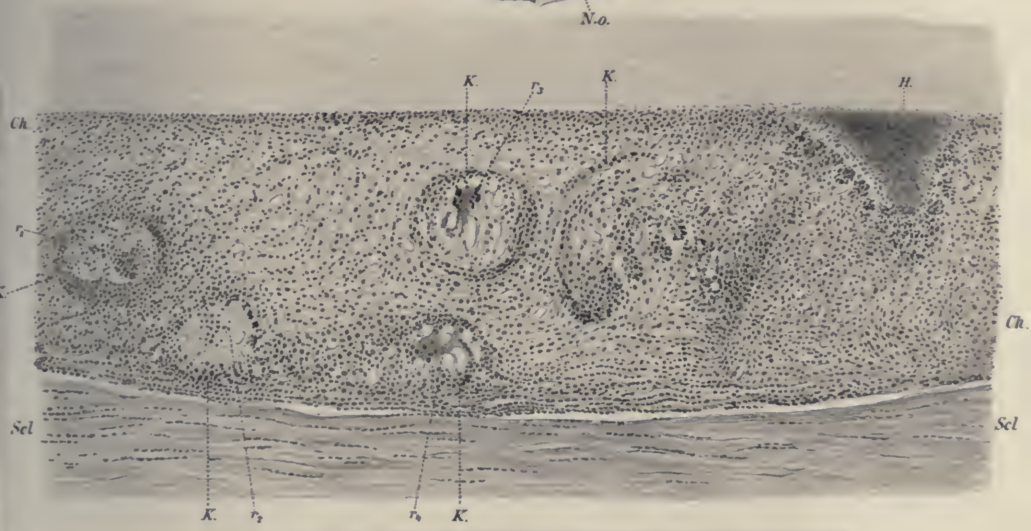
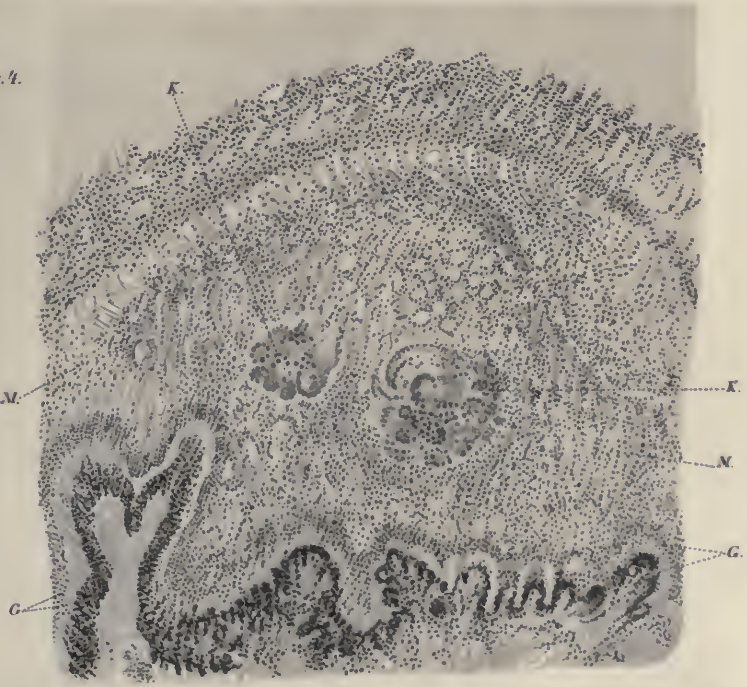


Fig. 4.



August 30*th.* Eye still irritated ; S, $\frac{1}{\infty}$; inunction and potassium alternately.

October 4*th.* Iridectomy, upward ; but only a small pupil can be obtained.

October 8*th.* S, somewhat better.

October 31*st.* Eye, irritable and totally blind ; ciliary vessels, varicose ; T, ——.

November 4*th.* Enucleation.

There were no other symptoms of syphilis, and the malignant termination of an apparently simple case of syphilitic irido-choroiditis was indeed surprising.

The globe lay in Mueller's fluid two years, was then divided nearly in the horizontal meridian, and through the artificial coloboma, when there was at once discovered a tumor in the ciliary body, which we thought, from the diagnosis of syphilitic irido-choroiditis, must be a gumma.

Macroscopic Condition of the Eye (plate xii., fig. 1).—At the temporal side of the corneo-scleral junction we see the iridectomy incision (*I.W.*) in which the iris is incarcerated. In the medial portion of the *ciliary region*, with its medium transverse diameter near the boundary between the choroid (*Ch.*) and the ciliary body (*Cp. c.*), is a tumor-like oval body (*T.*), about eight *mm* long and four *mm* across, and well-defined from the sclera by the thickened uvea. The centre of the tumor is yellowish from contact with the hardening fluid (*P.c.*). The retina (*R.*) is totally detached ; the choroid (Ch) lies close to the sclera, and appears thickened at spots.

Microscopic Condition (plate xi., fig. 2).—The tumor is divided into a peripheral zone (*p. Z.*), and a central portion (*c. P.*) of entirely different character. In the upper part of the former we can recognize in an almost uninterrupted fine line the margin (*G.*) of the normal uvea, with the posterior portion of the ciliary body (*Sp.*) swollen into a spindle shape, and the choroid (*v. Ch.*) thickened, though the pigment-layer has totally disappeared. Below is the tumor, bounded partly by the fluid (*F.*) which has coagulated behind the detached retina, partly by the innermost layer of the detached and folded retina (*R.*), which seems as if it had grown directly into the tumor and partly toward the vitreous (*Cp. V.*) by a fibrous structure (*G.*), which is intimately united with a well vascularized rind (*Schw.*), which fills the entire zonular region as far as the capsule of the lens. This peripheral zone of the tumor consists of a reticulated matrix, with oval and round nuclei, round and stellate cells.

The most remarkable sight is the large number of giant cells (myeloplaxes), sometimes as many as fifty or more in one section. They appear in spherical clumps (plate xii., fig. 3, r_1), or as disciform (r_2) elongated (r_3), or star-shaped structures (r_4). The central portion of the tumor has remarkly absorbed the tinting matter (carmine, hæmatoxyline), so that even macroscopically it has a darker appearance. It consists of amorphous granules and dense masses of cell detritus, occasionally of giant cells. We might therefore call the central portion of the tumor *a cheesy deposit.*

The *ciliary body* consists of a thick fibrous tissue, interspersed with round cells and nuclei, and then enlarged into a somewhat looser mesh-work, where it contains several round nodules analogous to those described in the tumor with a central reticulum and giant cells. A similar appearance is seen in the more distant retinal fold (plate xi., fig. 4, *K.K.*). Finally we observe two other nodules, with central flat giant cells in a excessively thickened granular layer of the retina itself (plate xii., fig. 4, *K.K.*).

The *retina* is folded and frilled, the granular layers (plate xii., fig. 4, *G.G.*) meandering; the molecular layer (*M.*) widened, abundantly infiltrated with round and granulation cells, and sprinkled with small round cells and giant cells, either separate or in little clumps.

The retina in the posterior temporal section terminates in a second circumscribed focus, enclosed between itself and the choroid, and consisting in the rear of cheesy nodules and giant cells, round and granulation cells.

The *choroid* is thickened (plate xiii., fig. 3), interspersed with round cells, the repeatedly mentioned nodules with giant cells, and reticulum (*K.K.*). A cheesy deposit is seen at *H.*

The microscopic investigation seems rather to favor the view of a *circumscribed tubercle of the choroid* than of a syphilitic gumma, with disseminated transmission into the choroid and retina; for we find all the characteristics of tubercle: round cells, somewhat larger granulation cells, or epithelial cells, the nodular arrangement, the reticulum, the giant cells in the centres of the nodules, the confluence of the latter, and the large central cheesy deposit. To be sure, the gumma in its initiatory infiltration stages is composed of the same histological elements, yet the *unusual abundance* of giant cells, as well as the *extremely pronounced nodular arrangement* of the small cellular elements, particularly around the giant cells, and, finally, the central cheesy deposit, argue much more forcibly in favor of the *tubercular character of the neoplasm in question.*

There may be variations between a tubercle and gumma which depend simply upon the greater or less number of giant cells and nodules, and especially in those portions of the body where the nodules (in particular) have so far been but slightly investigated. But as syphilis was acknowledged, and the clinical course of the case was the usual one under such circumstances, we needed the decisive proof of the presence of the tubercle bacilli. For this purpose Haab's method[1] was employed; the sections freed from celloidin were left for three or four days in a freshly prepared fuchsine solution, bleached in alcoholic nitric acid, and then again colored in methyline blue. *Long research amongst many sections at last revealed a few genuine tubercle bacilli,* and thus demonstrated, without the shadow of a doubt, the *real tuberculous nature* of the tumor in question. The bacilli were found in the giant cells, as well as in the reticulated tissue.

My first experiment with Haab's method having been fruitless, I resorted experimentally to Lustgarten's lately suggested method for exhibiting the *syphilis bacillus.* The sections were placed in ether-alcohol after being freed from celloidin, first tinted with Ehrlich's gentian-violet solution, then treated with hypermanganate of potassa and bleached with sulphuric acid. We did indeed find a few bacilli, which resembled the tubercle bacilli, but which Lustgarten vouches to be the bacilli of syphilis. Yet when we undertook *the bleaching test* which Lustgarten assures us is the characteristic one for the diagnosis between the tuberculous and the syphilitic bacillus, the bacilli that we had found *did not part with their tints.* For this purpose one part of nitric acid was added to two parts of water, and into the mixture was placed the section after it had been freed from its Canada balsam by the use of xylol and gradually diluted alcohol. And to verify the whole, the hardened (alcoholic) preparations of a tuberculous ulcer of the rectum, in which the tubercle bacilli stained by the same Lustgarten method were abundantly found, were subjected to the same treatment. The result was that after being subjected for a minute to the action of the acid, the bacilli in question, as well as the tuberculous bacilli from the rectal ulcer, *still retained their color ;* after two minutes' exposure both sets of bacilli grew pale, *yet those from the rectal ulcer somewhat the sooner.* Hence, according to this method, the bacilli obtained from the ciliary tumor must, from their similar behavior when subjected to the acid test, be regarded as genuine tuberculous bacilli.

---

[1] *K. M. f. A.*, November, 1884.

The diagnosis of tuberculosis of the choroid was during life almost impossible. The man showed no traces of tuberculosis, though syphilis was freely acknowledged, and yet under purely anti-syphilitic treatment the eye went to ruin. The patient was strong and active, but later he suffered from swelling on the foot, and died of sphacelus.

Nevertheless the tumor was of a tubercular nature.

Explanation of the Plates.

Plate XII., Fig. 1.—*C.* = Cornea ; *I.* = Iris ; *I. W.* = Iridectomy incision, with incarcerated iris ; *Z.* = Zone of Zinn ; *Cp. c.* = Corpus ciliare ; *T.* = Tumor ; *P. c.* = Central portion of tumor ; *Ch.* = Choroid ; *L.* = Lens ; *R.* = Retina ; *Scl.* = Sclerotica ; *N. o.* = Nervus opticus.

Plate XII., Fig. 3 (Zeiss A.).—*Ch.* = Thickened and infiltrated choroid ; *K. K. K.* = Tubercle nodules ; r_1, r_2, r_3, r_4, = Giant cells in the same ; H. = Cheesy deposit ; *Scl.* = Sclera.

Plate XII., Fig. 4 (Zeiss A.).—*M.* = Molecular layer ; *G. G.* = Internal and external granular layers ; *K. K.* = Tubercular nodules.

Plate XI., Fig. 2 (Zeiss A.).—*C.* = Cornea ; *I.* = Iris ; *L.* = Lens ; *Scl.* = Sclera ; *Cp. c.* = Corpus ciliare ; *Z.* = Zonula ; *Sp.* = Posterior, thicker portion of the ciliary body ; *G.* = Border-line of the still uninjured uvea ; *v. ch.* = Thickened choroid ; *Ch.* = Shrivelled choroid ; *p. Z.* = Peripheral zone of the tumor ; *Schw.* = nodule interspersed with vessels ; *e. e. e.* = Extravasations of blood ; *Cp. v.* = Corpus vitreum ; *f.* = Fibrous limiting layer ; *R. R.* = Detached retina ; *K. K.* = Nodules in the fibrous tissue of an inlet in the retina ; *F.* = Firmly, coagulated fluid behind the detached retina.

THE PATHOGENESIS OF GLAUCOMA.

By Prof. J. STILLING, M.D., of Strasburg.

Translated (abridged)[1] by H. A. B. MacCauley, M.D., New York.

(*With plate xiii.*)

THE EXIT OF THE FLUID OF THE VITREOUS BODY.

MOST ophthalmologists agree upon the principal points as to the channels by which the aqueous humor makes its exit from the interior of the eye; all observers, after the thorough and systematic investigations of Leber, unite in the belief that it penetrates the meshes of the spaces of Fontana, in order to pass into the anterior ciliary veins, either by means of simple filtration or by anatomical channels capable of demonstration. We are, however, completely in the dark as far as the greater part of the intra-ocular fluid is concerned, namely, the lymph of the vitreous.

If we wish to study the discharge of the lymph of the vitreous body, we must proceed systematically, as Leber did in his investigations of the anterior chamber, and endeavor, in the first place, to demonstrate the existence of anatomical channels before physiological experiments are made upon the living animal. Two possibilities are to be kept in view: either the lymph of the vitreous penetrates in some manner, however this may be, into the anterior chamber, and from there passes outward with the

---

[1] Thea bridgment in this and other articles is made by the Editor of the English edition; only rarely, and in a limited degree, it is left to the discretion of the translator. We repeat that the original papers will be sent for reference to our subscribers, on application to the editor. H. K.

FAIRMOUNT COLLEGE

Fig. 2.

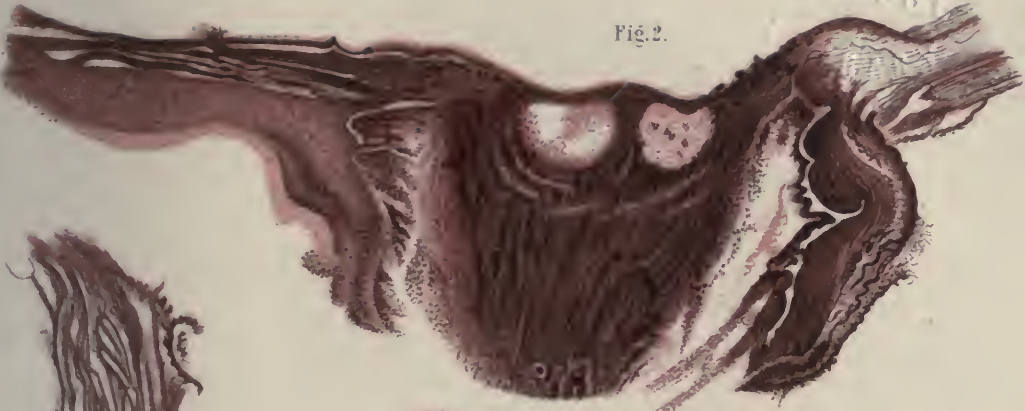


Fig. 3.

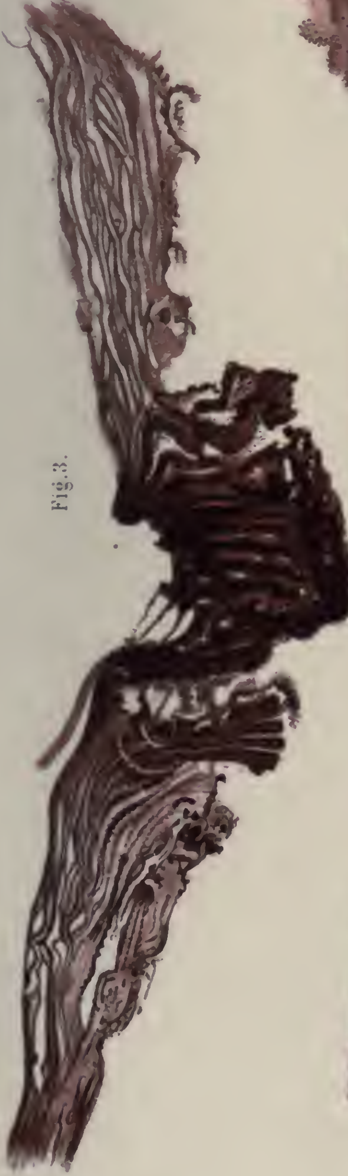
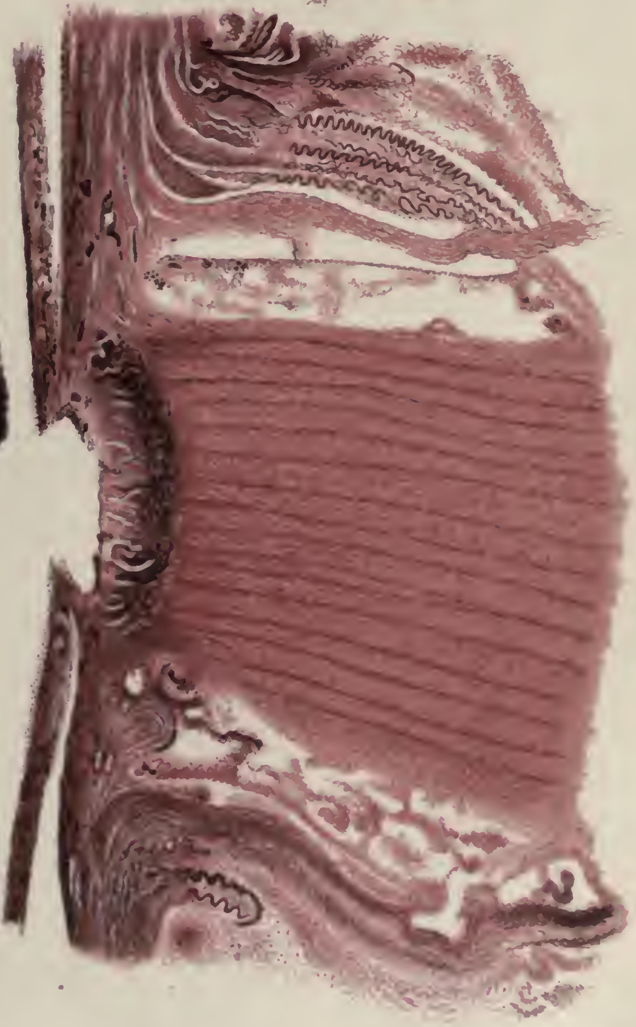


Fig. 1.



[illegible] [illegible]

ARCHIV OF OPHTHALMOL XVI.

aqueous humor through the spaces of Fontana, or there are independent channels for the escape of the vitreous.

The injection of non-diffusible colored fluid, such as alcannin-terpentine, Berlin blue-cinnabar, through the optic nerve into the vitreous body, continuing the injection until the eye is as hard as a stone, fails to give even a minimum injection of the anterior chamber.

On the contrary, only the following spaces show the injection :

1. The central canal of the vitreous, which is seen filled to the posterior part of the capsule of the lens.
2. The space separating the cortex from the nucleus of the vitreous body, and sometimes also the superficial layers (concentric lamellæ) of the cortex.
3. The space between the choroid and the retina, or, more properly, between the pigmentary layer and the retina.

A different result is obtained by the use of fluorescin, a fluid of great diffusibility, which being injected under high pressure through the optic nerve into the vitreous body, passes in considerable quantity into the anterior chamber in the dead eye as well as after a subcutaneous injection into the living.

From these experiments we are drawn to infer with certainty that the phenomena of fluorescence, as described in the living eye, owe their origin to processes of diffusion of a purely physical nature.

The phenomena of fluorescence in the living eye are the result of an excessive saturation of the blood with fluorescin.

The entire skin of the animal becomes intensely yellow, the urine remaining vividly green during a period of three weeks or more. The color passes out of the blood-vessels wherever it finds an exit, out of the vessels of the iris and the ciliary body, into the anterior chamber and the vitreous body.

If only small quantities of fluorescin are injected, the phenomena do not become manifest. In sufficient quantities, however, fluorescence takes place in the aqueous humor in a few minutes.

The space between the choroid and retina would seem to offer the only possibility of a real communication between the anterior chamber and the vitreous body, which could only take place with diffusible substances and under abnormal pressure; it is therefore impossible for the lymph of the vitreous to flow off with the aqueous humor.

The question, consequently, arises as to the existence of other anatomical channels by which the escape of the lymph of the vitreous body is possible. The existence of such channels has already been proven—namely, the central canal of the vitreous body and its communications, which may be injected from the optic nerve and its sheath. The central canal has undoubtedly the significance of a lymph space; it is lined with a hyaline membrane, and the injections prove that it is in communication with the concentric spaces formed by the lamellæ of the cortex as well as with the space between cortex and nucleus, facts which throw light upon the importance of this canal as a reservoir for the intra-ocular lymph.

EXPERIMENTS.

If the posterior section of a normal human eye, the superfluous water having been removed by means of absolute alcohol, be attached tightly to a well-closed glass tube and subjected to the pressure of a 12″ column of oil, the alkanna-red dissolved in terpentine filters first through the optic nerve, then through its sheath, finally forming a zone on the sclera more or less wide around the optic nerve. A real formation of drops takes place only on the optic nerve and its sheath, the principal part of the oil passing through the intervaginal space.

The sclera is more swollen, but drops soon form here also, if the experiment be arranged so that the oil can pass through the sclera only (the retina and choroid are not removed from the eye). I have made a very large series of experiments in comparative filtration in this manner, using eyes of all periods of life, and have arrived at the following results: the younger the eye the better it shows the filtration through the optic nerve and the sclera, and the wider becomes the zone of the sclera around the optic nerve, while with advancing age the filtration becomes less and less, and the zone smaller and smaller, until at seventy years the fluid barely filters through the nerve and its sheath.

I now compared with the filtration of the normal eye of various periods of life, a number of eyes which had been enucleated on account of glaucoma absolutum. Some I received a few days after their removal, others had lain in alcohol or Müller's solution for a long time, some of them for years. I was obliged for this reason to test accurately the influence these fluids would have upon filtration. I found the longer the eye lay in alcohol or Müller's fluid the better it filtered. In spite of this fact I found that the eyes which had been preserved in these fluids for many years filtered very badly, also that the senile eye filtered better than the glaucomatous eye. I then compared three eyes, one with "glaucoma absolutum," another with glaucoma and hemorrhages, the third with "glaucoma fulminans." That with the fulminating glaucoma filtered the worst, while the one with simple "glaucoma absolutum" was the best.

The chief result of my experiments, to be brief, is as follows: *From the young eye to the senile, and from the senile to the glaucomatous eye, there is a continuous decrease of the filtrating power.* There are, however, exceptions to this rule, in normal as well as in glaucomatous eyes.

PATHOLOGICAL ANATOMY.

The pathological change which will be described in the following has not as yet been mentioned elsewhere. In glaucomatous eyes, a peculiar separation of the lamellæ of the optic nerve may be noticed, principally on the outer lamellæ of the same, which blend with the zone of the sclera, surrounding the optic nerve. A sort of disjunction of the lamellæ may be seen in the normal eye, and has already been described.[1] Sometimes the dural sheath where it is inserted into the sclerotic, is seen to split into from two to four plates. This is, however, not to be compared with the sheath of the optic nerve of a glaucomatous eye.

---

[1] Michel, *A. f. O.*, Bd. xviii., 1, page 150.

I have found these changes constantly, more or less pronounced, in the glaucomatous eyes used for my observations. They numbered about twenty in all. It was most marked in " glaucoma absolutum " (see plate xiii.), where it could be seen distinctly with the naked eye, the sclera around the optic nerve appearing to be split into lamellæ ; the same when examined with a microscope showing a widening of the interspaces.

ATTEMPT AT A COMPREHENSIVE THEORY OF GLAUCOMA.

To review briefly the foregoing :

1. There is no open anatomical communication capable of demonstration between the anterior and posterior portions of the globe.
2. Diffusible fluids may, under pathologically altered conditions, penetrate into the anterior chamber from the vitreous body by means of the space between the retina and the choroid.
3. The escape of the lymph of the vitreous body takes place, in all probability, through the optic nerve and its sheath. Fluids may also pass directly into Tenon's capsule by means of filtration or diffusion through that part of the sclera bordering on the optic nerve.
4. The older the eye the smaller the scleral zone and the less the power of filtration. This is most marked in glaucomatous eyes.

I believe that from the experiments described, and the clinical and anatomical facts, the following conclusions may be drawn :

A glaumatous eye is nothing but a highly senile (sclerosed) eye, showing an increase of pressure which in the young eye is compensated for by filtration through the zone of the sclera surrounding the optic nerve, as well as through the interspaces of the dural sheath which are in communication with the scleral zone.

Although we have as yet no real tonometry, we must accept the fact that fluctuations of the intra-ocular pressure are not uncommon in the normal condition ; when we are awake, for instance, the tension of the globe is without doubt greater than when we are asleep; furthermore, it cannot be doubted that certain drugs exercise an influence upon the intra-ocular pressure. Chloral, for instance, has an important influence, my experiments upon animals showing a strong diminution of the intra-ocular pressure during the sleep caused by that drug. This may be considered as a valuable therapeutical hint. It certainly seems rational to provoke sleep under the influence of the drug at the time of the prodromal attack; the same in acute glaucoma, especially the night before the operation.

Our way of looking at the glaumatous process combines the two most important theories of the present time, inasmuch as we think it a hypersecretion within physiological limits in eyes with impeded channels of filtration.

The so-called apoplectic glaucoma is to be regarded as a complication. In eyes which are attacked by the same, the normal channels of filtration are not only narrowed by senile change, but atheroma of the retinal vessels is also present.

The course and symptoms of the different forms of glaucoma have for their *raison d' être* the possibility of a compensation of the existing hypersecretion and increase of tension. Increase of tension *per se* is by no mean glaucoma; it becomes such only when it is not compensated for in a correspondingly short time.

One of the conditions necessary for the fulfilment of this compensation is found in the thickness of the sclerotic; where it is very thick, it is evidently an obstruction to compensation. (I have frequently found it thicker in glaucomatous eyes than is usually the case.) Perhaps this has something to do with the predisposition of hypermetropic eyes to glaucoma and the relative immunity of the myopic eye. In reference to the last-named, it should be remembered that in myopic eyes we find a splitting of the sheath of the optic nerve which is continued sometimes a considerable distance into that part of the sclerotic surrounding the optic nerve, a circumstance which renders filtration considerably easier.

Graefe's theory of seeing in the increase of tension the main point of the glaucomatous process is completely correct.

Explanation of the figures, plate XIII.

FIG. 1.—Section through the posterior portion of an eye with glaucoma absolutum. The dural sheath of the optic nerve relaxed and divided into several plates. Interspaces of the sclerotic distinctly widened. Deep excavation (enucleated by Prof. Reymond at Turin).

FIG. 2.—Section through posterior portion of an eye with glaucoma simplex (iridectomy performed by Donders, later enucleated by Mooren). On one side the relaxation of the dural sheath is seen distinctly, but is not so pronounced as in the preceding drawing (fig. 1). On the other side it is hardly indicated. On the other hand, however, the tissue of the sheath of the optic nerve is changed into an apparently hyaline substance. This is also the case with the neighboring portion of the sclerotic, only a few lamellæ remaining of the original tissue, the cohesion of which is diminished.

FIG. 3.—Section of the same eye. The sclerotic appears to have given way like loosened basket-work. The optic nerve shows the same appearance. Deep cupping, with secondary atrophy and defects in the optic nerve.

THE RETURN TO THE FLAP-OPERATION.

By Professor C. SCHWEIGGER, of Berlin.

Translated by H. A. B. MacCauley, M.D., New York.

ONE of the most interesting changes in the ophthalmology of the present day is the return to the old method of cataract operation. The restoration of sight with the preservation of a round and movable pupil is undoubtedly one of the greatest operative achievements. How was it possible that we could have renounced the attainment of this ideal from the beginning? In order to answer this question we must go back thirty years. Ophthalmology at that time was dominated by the overpowering impression of the cure of glaucoma by iridectomy which, of course, was just as inexplicable then as it is now; then somebody or other invented the magic word of "antiphlogistic" iridectomy, and that became the cure, not only for existing but also for anticipated inflammation.

Also von Graefe, having found many indications which led him to favor the combination of the flap-operation with iridectomy, came around gradually to this idea, adhering to it in all cataract operations whether by discission or by the linear extraction so highly (and with justice) praised by him.

This method was described by v. Graefe in 1855 for the extraction of soft cataract in the young subject by means of an incision with the lance-shaped knife, and is excellent for cataracts without a hard nucleus. In very young children the operation of discission is the only one to be recommended; it may even be employed up to the twentieth year, but as soon as the individual is old enough to behave intelligently after the operation, the method of extraction offers greater advantages.

A necessary condition is complete opacity and softening of the lens, still it is not necessary to wait until this happens spontaneously; if loss of time is to be avoided, or if complete opacity is not to be expected, as in lamellar cataract, the desired softening may be effected by discission. Previous discission is also applicable to soft cataract in the young subject where, by absorption of the fluid constituents, the cataract has been changed to a dense mass; in such cases the aqueous humor brings about the necessary mobility for the operation of extraction.

Von Graefe did the operation as follows: He passed a knife through the sclerotic about two *mm* distant from the outer edge of the cornea and carrying the incision on parallel to the surface of the iris, thus making a wound about five *mm* long.

The capsule was then opened with the cystotome, light pressure with a curette was made on the peripheral side of the wound, with counterpressure in the neighborhood of the equator of the lens, and the lens was extracted. I have employed this procedure in all cases of soft cataract in the young, but prefer to make the wound larger (seven to eight *mm*) and more above. A broad lance-shaped knife is thrust in, about two *mm* below the superior border of the cornea, and pushed down until its point reaches the lower boundary of the anterior chamber. Upon withdrawing the knife it should first be passed into the corners of the incision, so as to widen the internal edge of the wound as much as possible.

As the flap-operation was the only method used at that time for the extraction of thoroughly opaque lenses, it is easy to see the advantage obtained by v. Graefe's procedure, and it is quite conceivable that he tried to apply the new method to nuclear cataracts also. The name which v. Graefe had chosen for his method was prejudicial to these endeavors; he called it the linear incision, and all the advantages which it possessed as compared with the flap incision in cases where the latter was really not suitable, were without further ceremony ascribed to its linear qualities. In a true linear incision through the cornea the inner and outer incisions would be in the same radius of the cornea, and the width of the lips of the wound exactly equal to its thickness. Such an incision could, of course, not be made with the lance-shaped knife, but was possible with v. Graefe's narrow knife which, from the puncture to the counter-puncture and completion of the incision, must be held so that the imaginary prolongation of its surface would pass through the centre of curvature of the cornea. According to my experience a true linear incision of this kind is not at all advisable in soft cortical cataract. The linear incision shows really all the disadvantages which were ascribed to the flap incision. It gapes more readily, giving passage at once to the fluid constituents of the softened lens, while when the attempt is made to empty the remaining denser mass, the vitreous humor pushes itself into the wound and retards the further progress of the operation. In addition to this, during repair, the lips of the wound being so small do not adhere readily, and there is a tendency to gape upon the slightest provocation, thus favoring prolapse of the iris.

It was certainly no disadvantage that von Graefe soon came to the conclusion that a real linear incision was impossible in cataracta senilis, and in fact the further we get away from this ideal, the better. Von Graefe however tried to keep as near to it as he could, making an incision in the border of the sclerotic as near to the periphery as possible, thus obtaining a greater distance of the angles of the wound with a small flap. It is almost forgotten at the present day that this incision was not infrequently followed by cystoid cicatrization, which fact was noticed by Hasner and confirmed by Welz, who proposed to avoid this by means of a preparatory iridectomy. Apart from this, it is evident to any one who has had any experience in cataract extraction, that owing to the narrowness of the wound, there was no place for the iris near the lens, and it consequently had to be sacrificed. In many cases over and above this, the incision was too small. The tendency from the beginning was to make a larger incision; this was only possible by a return to the flap operation, and so sailing under the false colors of linear incision, a gradually growing flap was used. At all events most ophthalmologists as well as myself agreed in employing an incision running in the limbus corneæ, giving a flap about three to four *mm* in height—this was about as close as we could get, with preservation of the iris.

Having now been obliged by force of circumstances to return to the flap incision, the next question was whether the small knife was suitable for it. It was excellent where a small flap was needed, with a small anterior chamber, as in many cases of iridectomy for glaucoma, etc., if, however, it was necessary to make the flap larger than the width of the knife the incision could only be finished by a sawing movement.

The most appropriate instrument as demonstrated by G. A. Richter over one hundred years ago, is one where the mere passing forward of the knife finishes the incision with the exception of a small bridge of tissue which is divided when the knife is withdrawn. The incision is no larger than that made with the small knife ; it may indeed be made any size desired, while the advantage of a regular clean cut, favoring cicatrization and the preservation of the curvature of the cornea, is quite evident. The incision to be sure is somewhat more difficult of execution. The main point is to hold the knife from the puncture in the inner edge of the limbus corneæ to the counter-puncture, exactly in the plane of the limbus, thereby avoiding the optical delusion caused by refraction in the aqueous humor—the apparent position of the blade in the anterior chamber being higher than it really is, so that when the attempt is made to pass out through the transparent cornea, the point of the knife penetrates deeper and passes out through the edge of the sclerotic with a resulting oblique incision. This happens with the small knife also, and must be corrected by withdrawing the knife and making another attempt, which of course does not contribute to the success of the operation.

Owing to the gradual widening of the blade of the cataract knife, the mere action upon its back is sufficient to accomplish the section, the small bridge which remains being cut through with a backward movement. If the small knife is used, for an upper section as it should be, the eye is drawn down with the fixation forceps, while the knife passes upward in the opposite direction ; this, coupled with the early escape of the aqueous humor, necessitating a deviation of the knife during the performance of the incision, is likewise very apt to produce irregularities in the wound.

For this reason I gave up the use of the small knife for cataract operations about a year ago and commenced using a knife which was 5 *mm* wide at a distance of 30 *mm* from the point. I soon, however, recognized the advantage of the old cataract knife and used first one 6 *mm*, and finally one 7 *mm*. Since then I have done all extractions of cataracta senilis with the triangular knife, with a flap about 4 *mm* high, gradually omitting iridectomy, at first in well-chosen cases, and later more often. In order to take up the old method of operation, I next selected cases where one eye had been operated successfully, and did the old flap operation on the other eye, below, where, following the former rule, the half of the cornea on the inner border of the limbus was cut through with the broad cataract knife of Beer. Eight of the ten patients operated upon in this manner showed an acuteness of vision of from $\frac{1}{2}$ to $\frac{1}{6}$; two had secondary cataract with posterior synechia, with however a good prospect of improvement by a second operation. In one case, prolapse of iris in the whole length of the wound took place. Nevertheless I did not deem it advisable to go further in this direction, but proceeded to make the incision above, as had been done before. With a flap 4 to 4.5 *mm* high there was not the slightest difficulty with the iris. If a few pigmented points are brought away with the cataract it is not of much consequence.

Naturally the transition to the old method was gradual. Then the important question arose as to whether the danger of prolapsus iridis in the classical operation, was really so black as it was painted, and the more I studied this point the more it seemed to me that its dangers had been exaggerated. Of course the precautions which must be taken to avoid it, have to be learned slowly, so that I hope the number reported in the first series of experiments will be greatly lessened.

In sixty cases of extraction, as described above, five only resulted in prolapse of the iris. Too large an incision is one of its causes which may be avoided. An incision involving half of the circumference of the cornea, as was employed at the time of the development of the linear incision, is entirely too large, as the tendency to gaping and prolapsus iridis increases with the size of the wound. A flap 4 to 4.5 *mm* in height is quite sufficient (by sacrificing the iris a still smaller incision can be used, as we have learned from the modified peripheral linear operation).

Furthermore, it is desirable to have a clean cut; not too peripheral, but in the transparent cornea, on the anterior edge of the limbus. Conjunctival flaps may be omitted without disadvantage. With the escape of the lens there is almost always some prolapse of the iris, but it can easily be stroked back with a curette.

Should, however, the iris be pushed into the wound by the pressure of the vitreous body, it is much better to do iridectomy at once. In illustration of this I cite the following case, which is also interesting in other respects.

Widow S., seventy-three years old, admitted to the University Hospital, March 1, 1887. Cataract of both eyes. Blind in right eye seven years; in left, one year. Complete opacity and gray coloring of lens on both sides. Nucleus not visible. Pupil reaction normal. Left, perception of light and projection good. With right eye can see concentrated light only. Extraction was performed March 3d, using a knife 7 *mm* wide. Small iridectomy. A large piece of the capsule removed with the forceps and lens escaped easily; the remaining cortical portion completely removed with scoop. *Result:* + 10 D; $S = \frac{6}{18} — \frac{6}{12}$.

As soon as the recovery of the left was assured, extraction without iridectomy was done, March 15th, on the right eye in spite of the defective perception of light. Incision with 7 *mm* knife and capsule drawn out with its entire contents by means of the forceps. Now, however, the vitreous body pressed forward, a part of it passing out, and it was impossible to reduce the iris, rendering iridectomy necessary, which was performed.

Result: $+$ 10 D; $S = \frac{6}{18} - \frac{6}{12}$. The perception of light was not so deficient as the patient had reported. The capsule of the lens was thickened, the lens containing a small yellow nucleus, while the corticalis was changed into a white emulsion.

In sixty-two cases without iridectomy, prolapse of the vitreous happened but twice. Prolapse of the iris is not necessarily caused by this, for the vitreous body presses it backwards, especially if the hyaloidea does not tear directly behind the incision.

Eserin should be dropped in the eye directly after the operation, and at the first change of the bandage perhaps. If used too long it favors iritis. Moreover, for the first three days both eyes should be closed by a binocular bandage, and finally, the main point of the after-treatment, any opening of the lid should be avoided. Eserin, cocaine, atropin, etc., may be used, but without opening the eye. The eye must not be examined at all, there really being nothing to examine.

A contracted pupil is desirable for the first two days; after this mydriatics are necessary, as more than fifty per cent. of all cases heal with posterior synechia. No other therapeutic measures are needed.

Absolute rest upon the back, as was formerly advised in the flap operation is not necessary; the patient may slowly change his position, avoiding of course all violent action. If the first three days are safely passed over in this manner, there is no danger of prolapsus iridis, unless some unforeseen accident should take place, as, for instance, in one of the five cases mentioned above it was caused by an hysterical attack with vomiting and syncope on the seventh day. If prolapsus iridis *does* occur, its excision is not advisable unless it occupies the greater part of the wound, and even then not until two weeks after the operation. Where it is small, it is often flattened down by cicatrization, at the same time improving the irregular curvature of the cornea. This was well shown in one case where the acuteness of vision, three weeks after the operation, was $\frac{1}{12}$, and improved in the course of two months to $\frac{6}{24}$. The injurious sequel of prolapsus iridis is essentially the subsequent irregular curvature of the cornea.

It is unnecessary for me to add that protrusion of the iris occurs often enough in extraction with iridectomy. In my opinion it may be avoided in most cases, and this removes the principal objection to the preservation of the iris.

It is a remarkable fact that the forms of incomplete opacity of the lens, in which extraction is permissible at all,[1] give just as good results if the extraction is done without as with iridectomy. The following case is a good example of this:

G., cabman, fifty-one years. Received in the University Clinic April 29, 1887, as his acuteness of vision being only $\frac{1}{12}$—$\frac{1}{9}$ rendered his occupation dangerous—cataract on both sides.

Lens of right eye shows grayish reflex in its middle, but no well-defined nucleus is seen by either focal illumination or the ophthalmoscope. Viewed with the ophthalmoscope, the opacity is seen in the middle of the pupil, most marked in the posterior cortical portion—the background of the eye is seen distinctly red through the edges of the lens. The optic nerve is seen "dimly as through a glass." The flap incision was done with the 7 *mm* knife, and the capsule opened with a toothed forceps. The lens then escaped easily, a flat amber-colored mass about 8 to 9 *mm* in size. The pupil became quite black at once.

May 21st.—Edges of pupil freely movable without synechiæ—the pupil quite free. On the periphery are seen several remaining shreds of the capsule. $S = \frac{6}{9}$.

The opening of the capsule in all the cases was done with the forceps, which, in spite of the teeth projecting downwards, passes easily beyond the iris, and under all circumstances, especially in capsular cataract, the removal of a piece of the capsule is a great advantage. Portions of the cortex remaining are to be scooped out with the small spoon. I do not contend that the results obtained in cataracta senilis without iridectomy are essentially better than with it, supposing the iridectomy to be a small one, at the superior portion, which in old people as a rule is covered by the upper lid. The lessening of the acuteness of vision, which is a necessary sequel of iridectomy, is caused rather more by the asymmetry of the cornea following its incision than by the enlargement of the pupil, being likewise present after sclerotomy. In spite of all this, the flap operation without iridectomy will regain its proper position, and for this we have to thank solely the introduction of cocaine; without it I at least should have continued to operate with the aid of narcosis, doing the flap operation with iridectomy above. Thanks to cocaine, however, anæsthesia has become unnecessary. Why, therefore, should we maim the iris needlessly? It is the glorious ambition of all of us so to operate upon an eye that no visible sign remain of the operation—*ars est celare artem.*

---

[1] This Volume, page 273.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY DURING THE FIRST QUARTER OF THE YEAR 1887.

By H. MAGNUS, Breslau; C. HORSTMANN, Berlin; and A. NIEDEN, Bochum.

WITH THE CO-OPERATION OF

C. E. Fitzgerald, Dublin; E. Marckwort, Antwerp; P. von Mittelstädt, Metz; Dantone, Rome; Hirschmann, Charkow; S. M. Burnett, Washington; Schjötz and Ole Bull, Christiania, etc.

Translated by F. E. D'Oench, M.D., New York.

Sections I.–V. Reviewed by Prof. H. MAGNUS.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

a.—TEXT-BOOKS, MONOGRAPHS, TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS.

1. Dimmer. The ophthalmoscope and ophthalmoscopic diagnosis. Leipsic and Vienna, 1887.

2. Nettleship. Diseases of the eye. London, 1887. The fact that a fourth edition of this text-book has appeared so soon, speaks plainly for its excellence.

3. Santos Fernandez. Clinica de enfermedades de los ojos. Habana, 1887. A collection of very able papers on the most important subjects in ophthalmology, published by his assistants, Drs. Madan and Acosta. 464 pages.

Dimmer's (1) compendium of ophthalmoscopy is well adapted for practical purposes, and we are inclined to consider it the best of modern efforts in that direction. The author has not fully utilized the literature of the subject, but nevertheless the little volume is a very useful one and worthy of commendation.

b.—STATISTICAL PAPERS.

4. BAYER. Report on the eye department of the Stefan hospital at Reichenberg for the year 1886. *Prager med. Wochenschr.*, 1887, No. 16.

5. BROOKLYN EYE AND EAR HOSPITAL. Report for 1886. Matthewson, Prout, and Rushmore.

6. FIEUZAL. Compte rendu de la clinique pour l'année, 1886. *Bull. de la clin. nat. ophth. de l'hosp. des quinze-vingts.* Paris, 1887, No. 1.

7. HOLT, E. E. First annual report of the Maine Eye and Ear Infirmary. Portland, 1886.

8. KUBLI. Report on the patients treated in the Dispensary of the Sisters of Charity at St. Petersburg from Jan. 1, 1882, to Jan. 1, 1887. *Wjestink ophth.*, Jan.–Feb., 1887.

9. NEWARK EYE AND EAR INFIRMARY. Report for 1886. Kipp and Rankin.

10. SCHIESS-GEMUSEUS. Basel Ophthalmic Institute. Twenty-third annual report for the year 1886. Basel, 1887.

BAYER (4) treated in 1886 719 new patients, and performed 181 operations. Since 1884 91 extractions have been performed, 62 of them with a small peripheric flap, 22 were linear extractions, 7 discissions. Good results, 85.9 %, moderate, 8.7 %, failures, 5.4 %.

THE BROOKLYN EYE AND EAR HOSPITAL (5) had during the year 1886 4,092 eye patients. There were 15 extractions, of which one was without iridectomy. BURNETT.

The clinic of the hospice des quinze-vingts (6) was visited by 9,801 new patients ; 959 were admitted. The number of beds has been increased from 25 to 65, and poor eye patients from all parts of France are admitted, provided they can be benefited or cured by an operation. Patients with diseases of the inner membranes are rarely admitted. Number of extractions, 459 ;—320 of them without, 139 with, iridectomy. In the first series good results were obtained in 74 %, moderate in 22 %, failures 3 % ; in the second 78 %, 18 %, and 3 % respectively. Incarceration of the iris and subsequent discissions were more frequently necessary than in former years, neither was the percentage of good sight as high as formerly. Among the other operations performed may be mentioned 53 paracenteses, 154 iridectomies, 17 iridotomies, 12 sclerotomies, 80 discissions, 82 tenotomies, and 97 enucleations.

HOLT (7) treated 224 patients. Number of operations on the eye, 96. Extractions by Graefe's method 7, 6 enucleations, 5 tenotomies, 2 advancements. BURNETT.

KUBLI (8) treated 19,588 patients with 23,286 diseases. For blennorrhœa he uses a 4% solution of boric acid as an antiseptic; chlorine water he considers better, but it spoils rapidly. He found that trachoma occurred more frequently in women than in men, the ratio being 1.4 : 1. He seeks the cause in the domestic employment of the former, living as they do in close, crowded quarters, where the germs can therefore more easily develop. He warns against the use of jequirity. He did not observe any favorable influence either on the trachoma granules or on the pannus; in two cases it produced complete xerosis of the conjunctiva and cornea. He saw five cases of amyloid tumors of the conjunctiva (lymphoma conjunctivæ of Raehlmann); one occurred in a boy three years old, in whom the growth was noticed at birth, and in whom it had developed to such an extent at the end of the first year that it completely covered the upper lid. It could therefore not be attributed to trachoma. Kubli traces 320 cases of hemeralopia, which occurred principally during Lent, to imperfect nutrition, exhaustion following excessive strain of the eyes, and irritation from strong light. HIRSCHMANN.

THE NEWARK EYE AND EAR INFIRMARY (9) had during 1886 2,701 eye patients. There were 14 extractions, of which 2 were without iridectomy. BURNETT.

SCHIESS-GEMUSEUS (10) in Basel treated 1,872 patients in the dispensary, 465 in the in-door department. He performed 238 operations, 60 of them extractions, all of these with good result. The clinical history of a number of interesting cases in given, among them one of detachment of the vitreous and one of sympathetic ophthalmia after hypopyon-keratitis.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

a.—GENERAL PATHOLOGY.

11. GALLENGA. Osservazioni di bacteriologia. *Ann. di ottalm.* vol. xv., 5–6.

GALLENGA (11) found bacilli and cocci (staphylococcus aureus and albus) in the secretion in conjunctival catarrh, and even in the mucus which gathers during the night at the inner canthus in the healthy state of the conjunctiva. DANTONE.

b.—GENERAL THERAPEUTICS.

12. CARL. A permanent bandage for the eyes. *Klin. Monatsbl. f. Augenhk.*, 1887, 32.

13. ROHMER. De l'antisepsie en oculistique. *Arch. d'ophth.*, vol. vii., No. 1.

14. SCHUMANN. Antiseptics and ophthalmology. Berlin, 1887.

CARL (12) covers the eye with a layer of gauze, a pad of cotton, and a larger piece of absorbent gauze. Collodion is spread over this gauze, fixing it to the face, forming an excellent bandage.

A number of papers have appeared on the question of antiseptics. ROHMER (13) has published an historical review, but presents nothing new. SCHUMANN (14) presents a critical study on the importance of antiseptics in ophthalmology, the essence of which lies in a recommendation of sublimate, the value of which has long ago been recognized. As usual, Schumann, makes some very remarkable assertions, which, however, do not surprise those who are familiar with previous papers of this author. The last one is full of them, some of which are very comical ; for instance, the majority of ophthalmologists will be surprised to learn that, from an embryological point of view, only fat people have the right to be myopic.

III.—INSTRUMENTS AND REMEDIES.

a.—INSTRUMENTS AND TECHNICAL CONTRIVANCES.

15. BURNETT, S. M. On some of the optical properties of spherical and cylindrical lenses placed obliquely to incident pencils of light. *Amer. Jour. Ophth.*, Jan., 1887.

16. JACKSON, EDWD. The equivalence of cylindrical and sphero-cylindrical lenses. *Trans. Amer. Ophth. Soc.*, 1886.

17. KEALL. Evisceration of the eyeball with introduction of silver artificial vitreous. *Brit. Med. Jour.*, Feb. 12, 1886.

18. OLDHAM, CHARLES. Glasses "à double foyer." *Brit. Med. Jour.*, Feb. 5, 1887. Calls to mind the glasses with a double focal distance, for distance and near work, which meet at an obtuse angle of 150°, the upper lens being placed vertically.

19. Smith, Priestly. A new tonometer. *Ophth. Rev.*, Feb., 1887, p. 39.

Burnett (15) has shown by experiments with Snellen's phacometer, that the focal plane of a lens placed obliquely is not situated at right angles to the optical axis, but inclined, and the inclination is in a direction opposite to the inclination of the lens. The author thinks that he can thus explain the advantage which cataract patients in particular derive from tilting the glasses. He also shows that the refractive power of a cylindrical lens is increased by rotation on its axis. Burnett.

Jackson (16) calls attention to the fact that all combinations of cylindrical glasses with their axes at right or oblique angles are either spherical or sphero-cylindrical, according to the relative power of the two lenses and the angle at which their axes are inclined. The method of finding the resultant of several superimposed lenses by the construction of a parallelogram is only a repetition of that devised by Stokes in his description of his lens.

Burnett.

Keall (14) introduces a hollow silver ball after exenteration of the globe, and unites the conjunctiva over it.

b.—REMEDIES.

20. Browne, Edgar. New remedies in ophthalmic practice. *Brit. Med. Jour.*, Jan. 15, 1887.

21. Gunn, Percy. Scopoline. *Brit. Med. Jour.*, Jan. 8, 1887.

22. Höltzke. The physiological action of atropine upon the eye. *Klin. Monatsbl. f. Augenhk.*, March, 1887.

23. Macklakow. Peroxide of hydrogen as a therapeutic and diagnostic agent. Meeting of Russian physicians at Moscow. *Russkaya Med.*, 1887, No. 4.

24. Panas. Études sur la nutrition de l'œil d'après des expériences faites avec la fluorescéine et la naphthaline. *Arch. d'ophth.*, vol. vii., No. 2, March–April, 1887. With illustrations.

25. Rampoldi. Dell' uso de sublimato corrosivo nella terapeutica oculare. *Ann. di ottalm.*, vol. xv., 5–6.

26. Trousseau et Fieuzal. Note sur le chlorhydrate d'hyoscine. *Bull. de la clin. nat. ophth. de l'hosp. des quinze-vingts*, 1887, No. 1.

27. Walter. Experimental and clinical observations on the action of hyoscine in ophthalmology. Inaug. Diss., Dorpat, 1887.

BROWNE (20) reports on several new remedies. Scopoline acts more rapidly and energetically than atropine, and its effect lasts longer. Muriate of aconite is of little value as a local anæsthetic, as its action is feeble and soon ceases. Iodol is equal to iodoform. Trichloro-phenol is a most useful antiseptic lotion in gonorrhœal ophthalmia in a solution of ½%. He washes out the anterior chamber after extraction, but warns against the use of strong mercurial solutions. He also says that the actual cautery has in his hands proved very successful in ulcers of the cornea.

GUNN (21) has found scopoline better than atropine in keratitis, corneal ulcers, and iritis. In his experience it has not caused conjunctival irritation. MAXWELL.

HÖLTZKE (22) shows that atropine paralyzes the endings of the oculomotor nerve, but does not irritate the endings of the sympathetic nerve at the same time.

Diluted peroxide of hydrogen (23), obtained from the peroxide of barium, is a useful remedy. It is a powerful antiseptic. When brought into contact with the conjunctiva, cornea, or skin, it remains unchanged when the epithelium and epidermis are intact. Should the latter however be injured, even though slightly, effervescence takes place, and the injured spot is covered with foam. The liquid also foams when it comes in contact with mucus or pus. Suppurating surfaces are rapidly cleansed by the H_2O_2, the liquid entering into the deepest and smallest fissures. It is a powerful remedy therefore in purulent keratitis, and MACKLAKOW has observed regeneration in desperate cases, in which the suppuration has been arrested by the H_2O_2. It can also be used for diagnostic purposes, for detecting injuries or foci of suppuration in the cornea, conjunctiva, and skin (also in other mucous membranes), invisible to the naked eye. The liquid foams when it comes in contact with the pus, the foam enters the injured tissue (causing emphysema), and thus indicates the diseased spot HIRSCHMANN.

PANAS (24) studied the nutrition and interchange of liquids in the eye with the aid of injections of fluorescine, and comes in general to the already known conclusions. For the same purpose he extended the experiments of Bouchard, who produced cataract in rabbits by feeding them with naphthaline. The animals received daily 3 grms. of a mixture of naphthaline and glycerine, which soon reduced their weight perceptibly. The first changes in the eye appeared on the thirteenth day in form of a synchysis scintillans.

The little crystals first showed themselves near the retina and then increased towards the posterior pole of the lens. Soon afterwards a few small white disseminate spots developed in the retina, which increased in number and extent, became partially confluent, and finally presented the picture of chorio-retinitis, a papillitis developing at the same time. These changes were followed by the appearance of radiating striæ in the posterior cortex, which gradually extended, especially around the nucleus, until the cataract was fully developed. Its color, gray at first, afterwards changed to an ochre yellow and rusty brown, perhaps due to dissolved iris-pigment introduced by osmosis. It is therefore a secondary cataract, resembling that of man which follows choroidal and retinal affections. Detachment of the vitreous and retina forms one of the most marked changes observed in the enucleated eye. Aggregations of leucocytes, and crystals of three varieties, consisting of oxalate and sulphate of calcium, were found near the hyaloid membrane in the vitreous, which was connected with the optic nerve by only a kind of stem. The histological conditions of the diseased portions of the eye, examined at various stages, are described at length in the original, and several illustrations are added. As the anterior portion of the globe never was affected, Panas concludes that it derives its nourishment from a source different from that of the posterior portion. Panas assumes that there is a current extending from the optic nerve through the retina and vitreous towards the lens. The central organs were not affected.

v. MITTELSTÄDT.

RAMPOLDI (25) has made very extensive application of a sublimate solution 1 : 2,000, and has used it with excellent result in affections of the lachrymal sac, in various forms of conjunctivitis, and in hypopyon-keratitis, in which he injects the liquid into the anterior chamber after paracentesis of the cornea. It has also given complete satisfaction as a disinfectant in cataract-extraction and its after-treatment, as since its introduction he has performed forty-two successive extractions without a loss. DANTONE.

TROUSSEAU (26) found, like others, that a 1 % solution of hydrochlorate of hyoscine has a more powerful mydriatic action than atropine. The mydriasis and paralysis of accommodation lasted, however, only three or four days ; in a case of iritis hyoscine acted beneficially. It had no toxic effects, and produced no symptoms of irritation. FIEUZAL obtained a good result with hyoscine in a case of serous iritis, in which atropine had failed, but observed the reverse in a case of rheumatic iritis.

WALTER (27) comes to the following conclusions: 1. Hyoscine (the muriate) closely resembles atropine in its action on the pupil and accommodation. 2. Its action begins much sooner, the mydriasis does not last as long, the paralysis of accommodation not quite as long. In this respect a solution of hyoscine 1 : 1,000 corresponds to a solution of atropine 1 : 120. 3. Hyoscine does not seem to affect the intraocular pressure in chronic glaucoma. 4. In acute glaucoma it is contra-indicated, while in some cases of chronic glaucoma sight and field of vision somewhat increase. 5. The constitutional effects of hyoscine are less dangerous. 6. For general use a solution of 1 : 1,000, 10 to 15 drops of which are to be instilled, or 1 : 400, 4 to 6 drops at a time, is recommended.

IV.—ANATOMY.

28. BERGER. Contributions to the anatomy of the eye in its normal and pathological state. Wiesbaden, 1887.

29. HAENSELL. Recherches sur le corps vitré. *Bul. de la clin. nat. ophth. de l'hosp. des quinze-vingts*, 1887, No. 1.

30. IWANOW. The question of the inequality of the pupils in healthy persons. *Wratsch*, 1887, No. 7.

BERGER (28) in his excellent work treats of the normal anatomy of the posterior chamber and the suspensory apparatus of the lens. He summarizes his results in the following sentences: 1. The posterior chamber is divided into a space free from fibres of the zonula (præzonular), a second containing them (zonular), and a third lying behind the zonula (postzonular). 2. The præzonular is from 0.2 to 0.4 *mm* deeper in the ciliary depressions than in the ciliary elevations. 3. From the zonular portion blind offsets extend into the depressions between the ciliary processes, and reach 1.0 to 1.5 *mm* farther back. 4. Most of the fibres of the zonula end in the anterior or posterior capsule of the lens; some, however, in the equatorial portion of the latter. The most anterior and most posterior fibres of this lenticular band are most numerous, so that the latter can be filled with a viscid mass (albumen) (Hannover's canal). Injected air, or a solution of aniline, pass through the lenticular band into the anterior chamber. 5. The postzonular portion of the posterior chamber is of a capillary nature. Its anterior boundary lies 1 *mm* inward from the equator of the lens, its posterior one 2 *mm* from the ora serrata. Its anterior wall is formed by the fibres of the zonula or the posterior ones of the lenticular band respectively; its posterior wall partly by thickened vitreous tissue, partly by fibres of connective tissue (lig. hyaloidea capsulare). Very delicate, reticulated fibres pass through the postzonular portion; it rarely contains rigid fibres of the zonula. 6. A postzonular (Petit's) canal is formed by detachment of the vitreous produced by an exudation (eyclitis, staphyloma bulbi, glaucoma), or it results from changes after death, or it can be produced by injection. Numerous "rigid" zonular fibres are visible in Petit's canal only in eyes in which putrefaction has begun, or they are the result of an imperfect injection. 7. The posterior portion can be injected with a viscid mass like albumen, or with air, but not with a solution of aniline. When albumen is used, however, it also enters the lenticular bands. The belief is wrong that by injection of the zonular portion of the chamber a "canal godronné" can be produced, the anterior wall of which is formed by the lamina vitrea of the pars ciliaris retinæ. 8. The outer layer of the vitreous is united in form of a circle with the posterior capsule of the lens, forming a postlenticular capillary space.

HAENSELL (29) injected a solution of jequirity into the vitreous of rabbits, and enucleated the eye three days later. The results fully agreed with those he had previously obtained as to the structure of the inflamed vitreous. A delicate net-work of fibres had been formed, at the intersections of which nuclei were observed. All the changes in the tissue corresponded, even in the minutest details, to the structural condition of the embryonic vitreous, and acted towards pigments exactly like the latter. For details in regard to the finer anatomy and color-reaction of the microscopic elements, see the original. V. MITTELSTÄDT.

IWANOW (30) made his observations on 134 healthy young military recruits, and found an equal width of the pupils in only 12 of them. The right pupil was larger in 49, the left in 73. The face was asymmetrical in 131, the left being larger in 99, the right in 32. The larger pupil frequently belonged to the smaller side of the face, while the latter usually seems to belong to the larger side of the body. An unequal width of the pupil does not, therefore, always have a pathological significance. HIRSCHMANN.

Sections V.–X. reviewed by DR. HORSTMANN.

V.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

31. MARTIN, G. Études sur les contractions astigmatiques du muscle ciliaire; chapter v. *Ann. d'ocul.*, vol. xcvii., p. 5.

32. Pflüger, E. Myopia and education. Wiesbaden: J. F. Bergmann, 1887.

33. Reymond. Contribuzione allo studio dell' innervazione per l'accomodamento. *Giorn. di R. Accad. di med. di Torino*, vol. iv., 1–2.

Martin (31) once more discusses the partial contractions of the ciliary muscle previously treated of (*cf. Ann. d'ocul.*, vol. xcvi., pp. 5, 81, and 217). An eye which tries to correct its corneal astigmatism by partial contractions of the ciliary muscle sometimes produces the same partial contractions in the other eye—*e. g.*, the ophthalmometric examination shows that an emmetrope has in his right a corneal astigmatism of 1 D, and in the left no asymmetry of the cornea; the subjective examination, however, shows that the right eye is not astigmatic, while in the left there is an astigmatism of 1 D. This double disagreement between the ophthalmometric and subjective examination is explained by assuming that in the right eye the corneal astigmatism is corrected by partial contractions of the ciliary muscle, while the stimulus acting upon the right eye similarly affects the left, and thus produces the astigmatism found by the subjective examination.

Marckwort.

According to Pflüger (32) the majority of myopes can trace their affection directly to the school; national peculiarities and heredity are less influential factors. Every thing that forces the scholar to hold the work near his eyes causes myopia. The development of M. is the more rapid and extensive the younger the person.

To check the development and growth of myopia, well-lighted rooms are necessary in the first place; the print must be good; Roman should be substituted for the German type; instruction in reading should be given as long as possible with the aid of the blackboard; the school-books must not be too thick, so that the scholar can easily hold them in his hand; and the line should not be more than 80–90 *mm* long. The body must be kept in the proper position while the pupil is writing, ink and pen should be preferred to the slate-pencil, the top of the table should form an inclined plane, calligraphy should not be practised, dictation should be dropped, as well as stenography.

VI.—LIDS.

34. Denotkin. The application of the thermo-cautery in entropium. *Wjestnik ophth.*, 1887, No. 1, p. 13.

35. Eversbusch, O. On transplantation of the epidermis in plastic operations on the lids and conjunctiva. *Münchener med. Wochenschr.*, 1887, No. 1, p. 1.

36. Schiess-Gemuseus. Congenital coloboma of the lids of both eyes. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxv., p. 8.

37. Ware, Lyman. Lupus vulgaris. *Journ. Amer. Med. Assoc.*, Feb. 12, 1887.

38. Ziem. Abscess of the lower lid in suppuration of Highmore's antrum and periostitis of the root of a tooth. *Allg. med. Centralztg.*, Nos. 48 and 49.

In entropium of the upper lid Denotkin (34) makes an intermarginal incision extending to the upper edge of the tarsus, thus dividing the whole lid into two layers; he then lays bare the entire surface of the tarsus, by drawing the outer layer (skin and muscle) upward with the aid of three sutures, which he does not tie, and then fastening it above the brow with cotton soaked in collodion, after which he cauterizes the exposed cartilage with the thermocautery parallel to the edge of the lid. Aseptic bandage. The ligatures are removed on the eighth day. The margin of the lid with the lashes then moves down slowly from the upper edge of the cartilage. The functional and cosmetic results of the operation are said to be good. Hirschmann.

In transplanting epidermis Eversbusch (35) uses pieces of skin 2–3 *cm* long and 1 *cm* wide, consisting of the stratum corneum lucidum, the rete Malpighi, and the papillæ projecting into the latter. They are put into a 0.6 % solution of chloride of sodium, and transplanted six or seven hours later. After carefully cleansing the wound and checking even the slightest hemorrhage, the whole surface is covered with the pieces of epidermis, so that not even the smallest space remains free. A layer of gauze soaked in a 0.6 % solution of chloride of sodium is then placed upon them, or iodoform is dusted over the field of operation. Finally a bandage of gauze and cotton is applied. This method is best adapted for large defects, or as a secondary operation for preventing symblepharon, when the ocular conjunctiva has also degenerated.

In the case reported by Schiess-Gemuseus (36) the coloboma occupied about one half the breadth of the lid. There was also a coloboma in the upper part of the iris, and there were clefts in the pharynx, lip, and nose, showing that the case was one of arrest of development.

WARE (37) successfully treated three cases of lupus vulgaris of the lids with acidum pyrogallicum. BURNETT.

ZIEM (38) observed suppuration of Highmore's antrum with subsequent abscess of the lower lid developing from periostitis of the root of a tooth. The abscess was probably caused by the entrance of the suppuration from the antrum through the recesses in the anterior wall of the maxilla, designated by Zuckerkandl as the intra-orbital sinus.

VII.—LACHRYMAL APPARATUS.

39. RAMPOLDI. Un caso notevole di fistola lagrimale capillare. *Ann. di ottalm.*, vol. xv., 5–6, p. 566.

40. SIMI. Una estirpazione della glandula lagrimale. *Boll. d'ocul.*, vol. ix., 1887.

RAMPOLDI (39) saw in a girl aged fourteen a capillary lachrymal fistula which opened about 2 *cm* below the inner canthus. After splitting it the author found that it did not communicate with the lachrymal sac, but directly with the lower lachrymal canal. The fistula closed after connection had been re-established between the canal and the shrunken lachrymal sac; and the probe had been passed through the whole canal several times.

DANTONE.

SIMI (40) extirpated a hypertrophic lachrymal gland, which probably had resulted from obliteration of the efferent ducts from trachoma, and had caused from time to time the most severe inflammation of the upper lid on account of the retention of the tears. The cure was radical. DANTONE.

VIII.—MUSCLES AND NERVES.

41. CUIGNET. Du strabisme convergent hypermétropique des enfants. Théorie nouvelle et traitement. *Rec. d'ophth.*, 1887. No. 2, p. 73, and No. 3, p. 155.

42. SECONDI. Strabismo. *Ann. di ottalm.*, vol. xv., 5–6, p. 493.

43. WADSWORTH, O. F. The amblyopia of squint. *Boston Med. and Surg. Jour.*, Jan. 20, 1887.

CUIGNET (41) is opposed to the theory of Donders in regard to convergent strabismus in hypermetropia. Nevertheless he recommends the wearing of convex glasses in treating strabismus, but orders them of a smoke color, to prevent the irritation caused by too strong light, which he considers one of the principal causes of strabismus. The vision of the squinting eye is preserved or improved respectively by exercising it according to the well-known methods, while the other is kept closed. MARCKWORT.

SECONDI (42) operated two cases of an extremely high degree of strabismus. In one of the patients the internal recti muscles were contracted to such an extent that in one eye the pupil was not visible at all ; in the other only slightly ; so that the patient could not walk alone. In the other case there was divergent strabismus and contraction of both external recti, while there was no power of convergence. A good result was obtained in both cases by dividing the contracted muscles and advancing their antagonists.

WADSWORTH (43) arrays himself on the side of those who do not look upon the amblyopia of squinting eyes as due to the squint, and thinks no well-authenticated case has been produced in which vision has improved after tenotomy. When vision has been exhaustively tested before tenotomy, no real improvement is found after it. BURNETT.

44. DE BRITTO, VICTOR. Note sur un cas de blessure de l'œil avec section complète du droit intérieur. *Arch. d'ophth.*, 1887, No. 1, p. 83.

VICTOR DE BRITTO (44) observed a case of complete separation of the right inferior rectus, 3–4 *mm* from its insertion, without injury to the sclera or the inner membranes. He does not state how this peculiar injury took place, but merely says that an iron wire had entered from left to right, and had been extracted at once. Double vision began soon afterwards, and still existed five months after the injury, when Britto first saw the patient. After a mass of granulation-tissue had been removed from the seat of the injury, the inferior rectus was advanced ; a very difficult task, on account of numerous deep-seated adhesions. The diplopia was only slightly diminished thereby, however, and did not entirely disappear until the left lower rectus had been divided.

V. MITTELSTÄDT.

IX.—ORBIT AND NEIGHBORING CAVITIES.

45. CROUZEFEYTE. De l'antisepsie dans l'énucléation du globe oculaire. *Thèse de Paris*, 1887.

46. ECKERLEIN, J. Case of pulsating exophthalmus of both eyes due to a traumatic rupture of the internal carotid in the cavernous sinus. *Inaug. Diss.*, Königsberg, 1887.

47. Ewetzky. Cylindroma of the orbit. *Wjestnik ophth.*, 1887, No. 1, p. 13.

48. Gaillard. Contribution à l'étude de la phlébite des veines ophthalmiques. *Thèse de Paris*, 1887.

49. Landouzy. Goitre exophthalmique. *Gaz. des hôp.*, 1887, p. 17.

50. Licharewsky. Dermoid cyst of the orbit. *Wjestnik ophth.*, 1887, No. 2, p. 129.

51. Mellinger, Carl. Two cases of orbital phlegmon with the ophthalmoscopic condition. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxv., p. 61.

52. Nieden, A. Another case of pulsating exophthalmus of both eyes after fracture of the base of the skull with paralysis of the second, sixth, and eighth cranial nerves. Ligature of the right carotid. *Arch. f. Augenhk.*, vol. xvii., p. 275.

53. Panas. Considérations sur la pathogénie des kystes dits séreux de l'orbite à propos d'une nouvelle observation. *Arch. d'ophth.*, 1887, No. 1, p. 1.

54. Ziem. Abscess in the orbit and fistula of the lachrymal sac in suppuration in Highmore's antrum. *Allg. med. Centralztg.*, 1887, Nos. 37, 38, 39.

According to Crouzefeyte (45) enucleation is an operation free from all danger when performed under proper precautions: antiseptics and drainage of the conjunctival cavity. Panophthalmitis does not contra-indicate the operation. As regards the subsequent prothesis, the stump after enucleation is just as well adapted for it as that after exenteration. The unfortunate results mainly occurred in pre-antiseptic times. Marckwort.

Ewetzky (47) reports on a cylindroma of the orbit. The tumor surrounded the left eye of a woman thirty years of age in form of a horseshoe, was 2½ *cm* high and 2 *cm* wide, and was removed by Dr. Lojetschnikow with preservation of the unimpaired eyeball. The tumor was lobulated, resembled boiled sago, and had an alveolar structure. Numerous hyaline globules were found in the alveoli. The greater part of the tumor consisted of cellular cylinders, which in distribution and shape resembled blood-vessels. Hyaline reticulæ were also found resembling capillary nets. A few of the cylinders were hollow, and in a few instances contained red blood corpuscles. Here and there the direct transition of cylinders into blood-vessels can be observed. The author therefore considers himself justified in concluding that the tumor was a cylindroma developing from the blood-vessels.

Licharewsky (50) extirpated a dermoid cyst the size of a pigeon-egg from the upper outer part of the orbit with preservation of the globe.

Mellinger's (51) first case was that of a woman, in whom an orbital phlegmon of the right side had developed in consequence of a trauma. The sight of the protruding eye had been destroyed; the ophthalmoscope revealed atrophy of the optic nerve and choroidal exudations. Vision did not improve, while the orbital affection healed. In the second case, that of a girl, a blow was the cause of the disease. The left eyeball protruded markedly and had completely lost its mobility. Vision was reduced, the papilla was slightly hazy. The retinal arteries were very thin, the veins very full. As the exophthalmus disappeared sight was gradually restored.

Panas (53) removed from a girl aged twelve a serous cyst of the left orbit, which seven years before had produced a slight protrusion of the inner portion of the lower lid, but had grown perceptibly only during the last year. The bluish little tumor could easily be seen through the thin skin, but could not be compressed and showed fluctuation. When the tumor was pressed back, a cyst the size of a cherry-stone and containing a clear liquid appeared from under the plica semilunaris. When removed it was found to consist of a larger and a smaller portion connected by fibrous tissue and united with the sclera and the sheath of the inferior oblique. The contents of the larger cyst were brown and viscid, of the smaller clear and serous, the latter also being filled with large leucocytes containing hematine granules. The inner wall of the cyst was covered with cylinder epithelium. Between the two cysts there was a portion of glandular appearance, around which lay lobated glands; in other parts of the tumor remnants of cartilage and fat-cells were found. The author divides congenital orbital cysts into two classes: true dermoid cysts and mucous cysts, the origin of which he ascribes to a separation by constriction of the ectoderma or mucous membrane of the respiratory passages respectively. The author places the cyst among the latter. v. Mittelstädt.

Ziem (54) treated a case in which, besides empyema of Highmore's antrum, there was an abscess in the orbit and a fistula of the lachrymal sac. The affection began in the antrum, whence it extended to the orbit and lachrymal sac.

X.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

55. ALT, A. On diphtheria of the conjunctiva. *Am. Jour. Ophth.*, 1887, No. 2, p. 41.

56. CHANGARNIER. La conjonctivite diphthéritique. *Rec. d'ophth.*, 1887, No. 1, p. 27. Report of a case of croupous conjunctivitis.

57. COLLINS, E. T. Treatment of granular ophthalmia with carbolic acid. *Ophth. Hosp. Rep.*, vol. xi., 3, p. 338.

58. DEBENEDETTI. Il sublimato corrosivo nella cura delle varie forme di congiuntivite granulo-tracomatosa. *Boll. d'ocul.*, vol. ix., 1, and vol. ix., 6.

59. HOLMES, E. L. A case of foreign body in the cornea. *Jour. Amer. Med. Asso.*, Feb. 19, 1887.

60. LOGETSCHNIKOW. The question of the treatment of blennorrhœa. Rep. on the ophth. section of the second meeting of Russian physicians, 1887.

61. LOGETSCHNIKOW. The trachoma-coccus of Michel. Read before the Physiol.-Med. Soc. at Moscow, Nov. 10, 1886.

62. REICH, M. On trachoma. Tiflis, 1887.

63. ROUQUETTE. Note sur le traitement de la conjonctivite granuleuse. *Gaz. hebdom.*, 1887, No. 1, p. 9.

64. SCHMIDT, E. On the micro-organisms of trachoma. *Russ. Kaya Med.*, 1887, No. 4.

65. SÖDERBAUM, P. Tankar om den profylaktiska behandlingen af Ophthalmoblennorrhœa neonatorum. *Eira*, March 15, 1887.

66. THIÉRY. Traitement de la blennorrhagie par des injections d'huile iodoformée. *Progr. méd.*, 1887, No. 10, p. 190.

ALT (55) gives the histories of nine cases of conjunctival diphtheria which he has seen in America. Of these cases, four corneæ sloughed, and in two there was leucoma of the cornea remaining. The best and quickest results of treatment were obtained when strict antisepsis was followed by the continued instillation of corrosive sublimate and boracic acid. BURNETT.

DEBENEDETTI (58) thinks that the solution of corrosive sublimate, as it is used at the Rosmini hospital in Milan, is almost a specific against granular and trachomatous ophthalmia. In milder cases a solution of 1 : 5,000 is sufficient, and may be instilled by the patients themselves. In the more advanced stages about thirty grms. of a 2% solution are dropped upon the inverted lids. The pain and smarting last for about one to three hours, but are less than after the application of nitrate of silver or sulphate of copper. Recovery is rapid. DANTONE.

HOLMES' (59) case was one in which the foreign body, a piece of steel, lay close to the cornea in the anterior chamber, and was removed through an enlargement of the original wound. (With what ?—K.) BURNETT.

LOGETSCHNIKOW (60) sets up the following propositions: (1) The treatment with nitrate of silver should begin as soon as the disease makes its appearance, though there may be membranes upon the conjunctiva. (2) Only 10 to 15% solutions are effective. (3) Such treatment (*a*) shortens the duration; (*b*) gives almost absolute surety of preserving the cornea; (*c*) makes the application of cold unnecessary, which, in the beginning of the disease, is not without danger. (4) The solution must only be applied as usual to the mucous membrane. (5) The adoption of Credé's prophylactic measures must render blennorrhœa a rare disease, while the abortive treatment described must remove its dangerous character. HIRSCHMANN.

LOGETSCHNIKOW (61) thinks that follicular catarrh and trachoma are not one and the same. Their identity must yet be proven. He therefore thinks that the micrococcus described by Michel should be more appropriately designated as the coccus of follicular catarrh instead of trachoma-coccus. The swelling of the preauricular glands is not characteristic of this disease. It occurs in various ocular affections, and is even frequently observed in children with healthy eyes. HIRSCHMANN.

The article of REICH (62) is mainly directed against the views expressed by Adamück in *Wratsch*, 1886, No. 50, in regard to the difference between folliculosis conjunctivæ and trachoma, and the infectious power of the latter. Reich calls attention to the fact, that although follicles of not specifically trachomatous character may be observed, we are unable to distinguish them from the milder forms of trachoma. The latter may be regarded as not infectious in the sense that in the absence of any perceptible secretion the danger of transmission is very slight. As regards sanitary stations, Reich remarks that their high elevation above the sea-level is not a sufficient guaranty against trachoma. This disease is very common in Alexandropol and Achalzyck in the Kaukasus, in spite of their great elevation. HIRSCHMANN.

Rouquette (63) uses a 2 % solution of nitrate of silver every 10 days, and sulphate of copper with glycerine 1 : 10 daily in the morning and evening in trachoma. Marckwort.

Schmidt (64) cultivated in various ways the conjunctival secretion of 80 pure, fresh cases of so-called follicular trachoma, also the liquid obtained by pressing out the granules. In 47 among 58 cases he failed to obtain cultures of the trachoma-coccus, which he found to possess great morphological resemblance to the staphylococcus pyogenes. The cocci are generally grouped in pairs (diplococci), or in chains of three and four ; longer chains are very rare. Only a few cocci move actively, when fresh, in water or glycerine, but this ceases after one or two minutes. When introduced into the conjunctival sac of dogs, rats, and rabbits, the cocci produced a more or less severe muco-purulent conjunctivitis. When the culture was mixed with water and injected into the anterior chamber, it produced panophthalmitis. In pigeons and cats the introduction of the cocci into the conjunctival sac produced characteristic trachoma, with swelling of the lids, and mucous membrane, projecting granules, and in pigeons sometimes accompanied with marked papillary hypertrophy. Only 7 of the 15 pigeons which he had bought could be utilized for the experiments, as the others were already affected with trachoma. Hirschmann.

Söderbaum (65) considers the prophylactic instillation of a 2 % solution of nitrate of silver in blennorrhœa neonatorum unnecessary in regions in which gonorrhœa is rare, but advises its use in lying-in hospitals. Ole Bull.

67. Benson, A. H. Fibroma of cornea. *Ophth. Rev.*, 1887, No. 63, p. 5.

68. Bock, E. Contribution to the knowledge of ribbon-shaped corneal opacity. Vienna, 1887. W. Braumüller.

69. Burchardt, M. On the coccus which is the cause of phlyctenular keratitis. *Centralbl. f. prakt. Augenhk.*, 1887, p. 40.

70. Collins, E. Preacher. Cases of interstitial keratitis with corneal ulceration. *Ophth. Hosp. Rep.*, vol. xi., 3, p. 338.

71. Franke, E. The galvano-cautery in ophthalmology. *Deutsche med. Wochenschr.*, 1887, No. 16.

72. Fromond. Du traitement par le feu de certaines affections de la cornée. Thèse de Paris, 1887.

73. da Gama Pinto. Treatment of prolapse of the iris in corneal ulcers. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxv., p. 1.

74. GALLENGA. Contribuzione allo studio delle cheratite superficiale infettive. *Giorn. di R. Accad. di med. di Torino*, 1887, Nos. 3 and 4.

75. LINDE. Om Anveldelsen of Cauterium actuale in destructive Cornealidelser. *Hospitals-Tidende*, Kjobenhaven, 1887, No. 6.

76. MAUFRAIS. De quelques emplois du fer rouge en oculistique. Thèse de Paris, 1887.

77. PINCUS, O. Contribution to the knowledge of congenital corneal staphyloma. Inaug.-Diss., Königsberg, 1887.

78. WIDMARK, J. Ytterligare nagra iakthagelser vörande dacryocystit och dere complikationen. *Hygiea*, vol. xlix., No. 2, 1887.

BENSON'S (67) case was that of a girl, æt. nineteen, who three years previously had noticed a white speck in front of the pupil without any sign of inflammation, which gradually increased in size and density. It presented the appearance of a dense leucoma 4 *mm* in diameter, but was raised above the surface of the cornea to the extent of about 1 *mm*. With a Bowman's trephine the margins were isolated, and it was dissected off. Histologically it was found to be a fibroma. FITZGERALD.

After an anatomical investigation of three cases of ribbon-shaped corneal opacity, BOCK (68) comes to the conclusion that the great majority of such cases occur only in eyes which have passed through some severe uveal affection. In this manner a pathological condition of the aqueous and vitreous is produced, in consequence of which the characteristic corneal opacities result. Why they should appear especially in the palpebral fissure Bock is unable to say.

BURCHARDT (69) found in corneal phlyctenulæ a comparatively small number of cocci, which greatly resembled the coccus flavus desidens (Flügge). It differs from the coccus pyogenes aureus by its smaller size. It is probable that this coccus alone is the cause of phlyctenular conjunctivitis and keratitis. The treatment of the latter disease should therefore consist in burning out the collection of cocci in the cornea.

FRANKE (71) recommends the galvano-cautery in so-called granular trachoma, in hypopyon-keratitis, in scrofulous corneal ulcer, in the typical serpent ulcer and certain forms of traumatic keratitis.

In comparatively large perforations of the cornea, with prolapse of iris, in which the scar consolidates but slowly, DA GAMA PINTO (73) recommends abscision of the prolapse, after which he covers the corneal wound with living tissue, thus not only ensuring a prompt closing of the wound, but also furnishing the material for a rapid, firm cicatrization. He uses conjunctival flaps without a pedicle for this purpose.

GALLENGA (74) made cultures from the contents of conjunctival and corneal pustules, and found a large and a small variety of micrococci. The former is not pathogenic, but the latter, when introduced beneath the epithelium of the conjunctiva or cornea, produces a superficial infiltration, from which the disease can be again transmitted. When the epithelium is intact, the coccus produces no effect. As the author had observed that in patients suffering with pustules the eyelashes are frequently affected, he also examined the roots of the diseased ciliæ and found there the same coccus. He therefore believes that the superficial corneal affection, so frequent in young, weakly individuals, has its origin in the bulbs of the eyelashes. DANTONE.

MAUFRAIS (76) advises to confine the galvano-cautery to those cases of serpent ulcer which have resisted hot applications and brushing out with antiseptic solutions. MARCKWORT.

PINCUS (77) describes the anatomical condition of an eyeball with congenital corneal staphyloma, which had been removed from a child aged ten months. The affection can be attributed to an ocular disease in the second half of fœtal life, a fœtal keratitis, as all the other parts of the eye were already formed.

In three cases of serpent ulcer and four of phlegmonous dacryocystitis WIDMARK (78) found the staphylococcus albus either alone or associated with aureus. The accompanying conjunctivitis is due to the presence of the micro-organisms in the tears, and not to their entrance into the tissue. The serpent ulcer, however, is due to the introduction of these microbes into the corneal tissue. When they are inoculated into the cornea, perforation of the latter and destruction of the globe result, especially when the centre of the cornea is inoculated. OLE BULL.

79. ARMAIGNAC, H. Epine ayant séjourné pendant trente deux ans dans l'épaisseur de la sclérotique. *Rev. clin. d'ocul.*, 1887, No. 3, p. 53.

80. STADERINI. Nota sopra un caso di sclerotite. *Ann. di ottalm.*, vol. xv., 5–6, p. 574.

A lady thirty-eight years old consulted ARMAIGNAC (79) on account of a persistent conjunctivitis, and at the same time called attention to a sensitive black spot upon the sclera about 5 *mm* from the corneal margin, around which the symptoms of irritation were most marked. Armaignac suspected the presence of a foreign body, and after cutting through the conjunctiva extracted a thorn 3 *mm* long and ½ *mm* thick, which must have entered the sclera thirty-two yeas ago, when the patient fell into a thicket, but had not caused any trouble. The only visible trace of the injury was the black spot on the sclera, which had been there since her childhood. V. MITTELSTÄDT.

STADERINI (80) describes a case of purulent scleritis due to the entrance of a piece of a thorn near the insertion of the external rectus. Although the foreign body came out as soon as the little abscess was opened, secondary points of infiltration formed around the cornea, and the edge of the latter became hazy. In the course of the disease, which lasted four months in spite of energetic treatment, the interior of the eye became congested, but in the end complete recovery resulted. DANTONE.

81. BETTMANN, BŒRNE. Recurrent hemorrhage into the anterior chamber. *Jour. Am. Med. Ass'n*, Feb. 5, 1887.

82. GALEZOWSKI. Étude sur la cocaine et sur son emploi en ophthalmologie. *Rec. d'ophth.*, 1887, No. 2, p. 91.

83. WEBSTER, D. On the adaptation of Corning's method of producing local anæsthesia by cocaine to operations on the eyelids.—*N. Y. Med. Rec.*, March 5, 1887.

84. WILLIAMS, A. W. Cocaine in ophthalmic surgery and medicine. Boston, 1887.

In BETTMANN'S (81) case there was injury to the eye from a blunt projectile and a hemorrhage which filled the anterior chamber. This was absorbed in a few days, but afterwards recurred and was absorbed twice. BURNETT.

GALEZOWSKI (82) discusses the latest papers on cocaine. According to him Panas found that the cocaine furnished by the Paris hospitals caused mydriasis lasting as long as that from atropine. Calmeils, chemist in the laboratory of the hospital Hôtel-Dieu, found that this preparation contained an alkaloid derived from hygrine, which forms during the preparation of the cocaine, when the coca-leaves are thoroughly extracted. This new substance produces a powerful mydriatic effect. The mydriasis, however, completely yields to eserine, while atropine mydriasis is only temporarily suspended by eserine.

MARCKWORT.

WEBSTER (83) makes an adaptation of Corning's method as follows: a number of very fine punctures are made in the skin by means of an instrument devised for the purpose. A sponge saturated with a 4 % solution of cocaine is then placed over the punctures. This sponge is connected with the positive pole of a galvanic battery of five or six cells. In five or six minutes the skin is found to be anæsthetized.

BURNETT.

Sections XI.–XX. Reviewed by DR. NIEDEN.

XI.—IRIS.

85. CHASE, JOHN. Cyst of the iris. *Amer. Journ. Ophth.*, Feb., 1887.

86. HUTCHINSON, JR. The pupil symptoms met with after injuries to the head. *Ophth. Rev.*, April, 1887, p. 97.

87. RAMPOLDI. Sur une nouvelle cause de mydriase. *Rec. d'ophth.*, March, 1887.

88. DE VINCENTIIS. Iridotomia. *Ann. di ottalm.*, vol. xv., 5–6, p. 559.

In CHASE'S (85) case there had been two iridectomies done, one upward and another upward and inward. The cyst was on the iris between the two colobomas. It was removed with its underlying iris. No return three months after the operation.

BURNETT.

HUTCHINSON (86) found that in concussion of the brain during the collapse stage the condition is fairly constant, the pupils are neither contracted nor dilated, and they respond, though often sluggishly, to light. When one pupil is markedly dilated, there are probably small hemorrhages in the cortex on the same side, and there is little doubt that whatever view be taken of the condition of the cerebral circulation the cerebral functions are more or less interfered with by the violent shaking of the brain. In a few cases of concussion of the brain fixed mydriasis in both eyes has been noticed. Cases of one-sided mydriasis following concussion and persisting for a considerable time are exceptional without evidence of severe injury to the brain. Occasionally they are to be explained by injury to the third nerve or its nucleus.

Partial or complete rupture of the third nerve has been found occasionally. As a rule, if the cortex and deeper parts be injured and inflammatory reaction set in, the pupils become strongly contracted, though the lesion may be some distance from the corpora quadrigemina. FITZGERALD.

When the lens is healthy, DE VINCENTIIS (88) performs iridotomy in the following manner: after an incision has been made with the lance-shaped knife, the edge of the sphincter of the iris is seized with a delicate forceps and drawn out of the wound. The iris is then pierced at the periphery with a Graefe knife and the cut prolonged by pushing the instrument forward to the sphincter where it is held with the forceps, the branches of the latter being opened to allow the knife to pass through. The two flaps of iris are then replaced in position. Before and immediately after the operation eserine is instilled; after restoration of the anterior chamber, atropine. The author has performed iridotomy according to this method in eight cases with excellent result. (See Schöler, Iridotomia extra-ocularis, *Berl. klin. Wochenschr.*, 1886, No. 40, and 1887, No. 44.—H. K.) DANTONE.

XII.—CHOROID.

89. ARMAIGNAC, H. Chorioidite aréolaire monoculaire terminée par le rétablissement à peu près complet de la vision mais avec persistence de l'aspect primitif du fond de l'œil. *Rev. clin. d'ocul.*, No. 3, 1887, p. 49.

90. BERGER, E. Contributions to the anatomy of the eye in its normal and pathological state. With an atlas and twelve lithographic plates. Wiesbaden, 1887, J. F. Bergmann.

91. GILMORE, A. P. A case of acute iridocyclitis with persistently increased tension successfully treated by Badal's operation. *N. Y. Med. Rec.*, Jan. 29, 1887.

92. HOLMES, E. L. A case of intra-ocular tumor. *Journ. Amer. Med. Assoc.*, Feb. 19, 1887.

BERGER (90) discusses at length the structural changes in the different membranes of the eye as they are found in phthisis after iridocyclitis; for details see the original.

In GILMORE'S (91) case the iridocyclitis was idiopathic, and as a *dernier ressort* neurectomy of the nasal branch of the trigeminus was tried. All the symptoms, subjective and objective, disappeared in a short time after the operation. BURNETT.

Holmes (92) describes a sarcoma of the choroid in a man sixty-two years of age. The growth had perforated the cornea, and there were nodules in the orbital tissue. Burnett.

XIII.—GLAUCOMA.

93. Armaignac, H. Glaucome aigu à répétition guéri chaque fois par les instillations d'ésérine et de cocaine. *Rev. clin. d'ocul.*, 1887, No. 1.

94. Berger, E. Contribution to the knowledge of the glaucomatous excavation of the optic nerve. Contributions to the normal and pathological anatomy of the eye. Wiesbaden, 1887, J. F. Bergmann.

95. Simi. Puntura della sclerotica nel glaucoma. *Boll. d'ocul.*, vol. ix., Feb. 3, 1887.

In July, 1885, Armaignac (93) prescribed cocaine for a gentleman aged sixty-six at the beginning of a glaucomatous attack. Next day symptoms of inflammation appeared and his condition was markedly worse. Cocaine and eserine were alternately instilled several times, whereupon rapid improvement took place, so that after a week V, T, and the appearance of the eye were normal again. Temporary obscurations were, however, still noticed at times, so that the use of pilocarpine, eserine, and cocaine was continued for three months, after the discontinuance of which there was another acute attack. Recovery in three days under the same treatment. Since then no attack. v. Mittelstädt.

Berger (94) discusses at length the pathologico-anatomical changes in the different membranes in glaucomatous excavation of the optic nerve; a detailed report would exceed the limits of a review. He speaks of the position of the central blood-vessels in relation to the fibres of the optic nerve, the relation of the anatomical to the ophthalmoscopic depth of the excavation, etc.

Simi (95) performed repeated punctures of the sclera in a case of acute glaucoma in both eyes with +T3, which had existed for several weeks, and in which $V = 0$ in one eye and in the other $= \frac{1}{\infty}$; an iridectomy did not seem indicated on account of the shallowness of the anterior chamber and the marked mydriasis. The result was unexpectedly good; after three weeks the tension was normal, and the patient could count fingers at 3 metres with the right eye and 1½ with the left. As the anterior chamber had become deeper and the pupil somewhat narrower under the use of iodoform and eserine, an iridectomy was performed on both eyes, completing the recovery. The final result was: field of vision almost normal, fingers counted with the right eye at 5½ metres, with the left at 5⅓, which condition had not changed after three months. DANTONE.

XIV.—SYMPATHETIC OPHTHALMIA.

96. AYRES, S. C., and ALT, A. A case of sympathetic neuroretinitis with an anatomical examination of the enucleated eye. *Amer. Journ. Ophth.*, Feb., 1887.

97. BERGER, E. The question of sympathetic transmission. Contributions to the normal and pathological anatomy of the eye. Wiesbaden, 1887, J. F. Bergmann.

98. CORNWALL, F. A case of sympathetic ophthalmia thirty-five years after injury; recovery by enucleation. *Amer. Journ. Ophth.*, Jan., 1887.

99. MINOR. J. L. Sympathetic ophthalmia. *N. Y. Med. Journ.*, March 19, 1887.

In the case of AYRES and ALT (96) the man received a blow from a piece of wood, which opened the left eye through the ciliary region. Right eye sensitive to light ever since the accident, but could see well up to the time Ayres saw him, nearly two months after the injury. At that time V = 0.3, and there was optic neuritis. No involvement of the iris or ciliary body. The injured eye was enucleated. Examination by Alt. It was negative as regards bacteria. From the appearance of the optic nerve he thinks Knies' theory supported, that the inflammation follows the pia-mater sheath from one eye to the other. BURNETT.

As regards the mode of transmission of sympathetic ophthalmia, BERGER (97) found inflammatory changes in the optic nerve in fourteen among sixteen cases, and therefore believes, as he also found colonies of micrococci in the intervaginal space of an eye sympathetically affected, that the theory of migration along the optic nerve is the most probable one. He does not assert, however, that the disease is always of mycotic origin, or that it is not sometimes transmitted through the ciliary nerves.

In CORNWALL'S (98) case the eye had been injured thirty-five years before. No symptoms up to the time application was made to the author, who found an optic neuritis in the fellow eye. Enucleation of the offending eye revealed an ossification of the choroid. Recovery of the sympathizing eye was perfect. BURNETT.

In MINOR'S (99) case the points of interest are, that the sympathetic trouble arose from an eye lost from panophthalmitis, the development of the sympathetic trouble after the enucleation, trouble in the optic nerve in the offending eye giving rise to cyclitis in the other. There was also spasm of accommodation. The issue of the case was successful. BURNETT.

XV.—LENS.

100. AYRES, S. C. The after-treatment of cataract operations. *Amer. Journ. Ophth.*, Jan., 1887.

101. BAKER, A. R. A further report of extractions of senile cataract. *Amer. Journ. Ophth.*, Jan., 1887.

102. BUSINELLI. Lussazione anteriore di un nucleo di cataratta Morgagniana. *Ann. di ottalm.*, vol. xv., 5–6, p. 31.

103. BOUCHARD et CHASSIN. La cataracte artificielle du lapin. *Soc. de biol.*, séance du 18 Dec., 1886.

104. BRITTO. Note sur deux cas d'accidents après l'opération de la cataracte. Emploi des injections de sublimé ; guérison. *Union. méd.*, 1886, No. 143, p. 663.

105. BURNETT, SWAN M. Cataracta nigra. *Med. News*, Jan. 29, 1887.

106. CHODIN. The use of the thermometer in operations on the eye. Report of the ophth. sections of the second meeting of Russian physicians at Moscow.

107. DOR. De la production artificielle de la cataracte à la naphthaline. *Rev. génér.*, 1887, No. 1, p. 1.

108. EWETZKY. Albuminuria and cataract. *Wjestnik ophth.*, No. 2, 1887.

109. GONELLA. Di un opacamento parziale del cristallino in occhi affetti da retinite sifilitica. *Ann. di ottalm.*, vol. xv., 5–6, p. 539.

110. KAMOCKI, V. Pathologico-anatomical examinations of eyes of diabetic persons. *Arch. f. ophth.*, vol., xvii., p. 247.

111. KAZAUROW. Extraction of cataract according to a simplified method. *Wjestnik ophth.*, 1887, No. 2.

112. KNAPP, H. Report on a ninth and tenth series of one hundred consecutive cases of cataract extraction performed according to v. Graefe's method. *N. Y. Med. Journ.*, Feb. 19, 1887.

113. MURRELL, T. E. The after-treatment of cataract extraction according to Michel's method. *Jour. Amer. Med. Assoc.*, Feb. 19, 1887.

114. NOYES, H. D. Extraction of a hard cataract. Death on the fifth day. Examination of the eye. *Trans. Amer. Ophth. Soc.*, 1886.

115. RAMPOLDI. Sulla natura infettiva della panoftalmite che talora consegue alla estrazione della cataratta. *Ann. di ottalm.*, vol. xv., 5–6, p. 544.

116. RAMPOLDI. E ancora indicato in qualche caso la depressione della cataratta? *Ann. di ottalm.*, vol. xv., 5–6, p. 423.

117. v. STEIN, STANISLAUS. Cataract produced by sounds. *C. f. A.*, vol. xv., p. 6.

AYRES (100) does not adhere any more to the rigid rules once in vogue in the treatment of cataract patients. He has discarded the roller bandage, and uses simply some absorbent cotton held in place by strips of plaster. BURNETT.

The operations of BAKER (101) were according to Graefe, with a large iridectomy and peripheral capsulotomy. In the twenty-two cases there was one failure. BURNETT.

BUSINELLI (102) succeeded in pushing back a nucleus dislocated into the anterior chamber through the pupil into the vitreous and beyond the pupillary area, as for various reasons he did not wish to extract it. DANTONE.

BRITTO (104) saw in two patients, several days after extraction, traumatic rupture of the wound with marked chemosis. The wound and anterior chamber were washed out with a solution of sublimate 1 : 2,000, eserine was instilled, and a compressive bandage applied, wherupon rapid recovery took place.

MARCKWORT.

BURNETT (105) gives the histories of two cases of cataracta nigra, on one of which he operated with success. The diagnosis would have been impossible, in the opinion of the author, without the catoptric test of Purkinje. The lens extracted in its capsule was all nucleus, there being no soft corticalis at all. It was of an even reddish-amber color by a transmitted light, the color gradually increasing in intensity from the periphery to the centre. There was no pigment. BURNETT.

CHODIN (106) has regularly observed a rise in temperature, after extractions reaching, in several cases, 38°, and even 38.7°, in complicated cases (complications on part of the cornea, iris, ciliary body, and choroid); when the course of healing was normal, the temperature did not rise. HIRSCHMANN.

DOR (107) repeated the experiments of Bouchard on artificial cataract; he gave naphthaline to rabbits and guinea-pigs (½–2 grms. daily, according to the size of the animal). In rabbits numerous white spots appeared in the retina on the third day, on the fifth the first traces of a cataract were noticed, which gradually ripened as the naphthaline was continued. At the post-mortem it was found that the white spots were present, not only in the retina, but also in the choroid and entrails. When the naphthaline was discontinued as soon as the white spots appeared in the fundus, a cataract did not form. The guinea-pigs resisted the naphthaline, no cataract forming. Dor briefly mentions two papers which discuss the same subject: Bouchard and Chassin (la cataracte produite par naphthaline), and Panas (études sur la nutrition d'œil d'après des expériences faites avec la fluorescine et naphthaline. Comm. à l'Acad. de méd, séance du 8 Fevr., 1887). The results of the different investigators perfectly agree in the main point—the artificial production of cataract by naphthaline.
MARCKWORT.

EWETZKY (108) made a series of examinations to decide the question of the influence of albuminuria on the development of cataract. He examined the urine in 200 cases of cataract and found albumen in 38, or 19 %, and casts in 7 %. In patients under 50 albumen was found in 28.5 %, over 50 in 17 %. The result of the operation was much poorer in albuminuric patients: $V = 0$, or $\frac{1}{\infty}$ in 13 % of them, in those not thus affected in only 4 %. The author thereupon examined the eyes of 90 patients suffering with nephritis, and found among 67 of them, who were younger than 50, cataract in only 1 case (unilateral posterior polar cataract, apparently, having no connection with the nephritis); among 23, who were older than 50, cataract in 6. Ewetzky then examined the inmates of St. Catherine's Asylum, all of them between the ages of 50 and 90, for opacities of the lens, and found them in 264, or 45.2 %. With increasing age the frequency of opacities of the lens increased as follows:

Between 50 and 59 there were opacities of the lens in 20.9 %
" 60 " 69 " " " " 43.75 "
" 70 " 79 " " " " 52.6 "
" 80 " 89 " " " " 66.6 "

The percentage of men and women was about the same. He also examined the urine and found albumen:

Between the ages of 50 and 59 in 6.95 %
" " 60 " 69 " 10.6 "
" " 70 " 79 " 10.6 "
" " 80 " 89 " 15.2 "

The author concludes from his investigations that albuminuria, which is by no means a proof of nephritis, does not play the important part in the etiology of opacities of the lens ascribed to it by Deutschmann and Landesberg. Age is a much more important factor in this respect. Above the age of eighty lenses free from opacities are the exception. Imperfect nutrition contributes to the development of cataract. Both sexes are subject to cataract to the same extent. Young persons suffering from nephritis are seldom affected with cataract, while in older ones cataract is frequent, but not more so than in persons of the same age not suffering with nephritis. The albuminuria frequently observed in cataract patients is physiological. Hirschmann.

In five cases of diffuse retinitis of syphilitic origin Gonella (109) saw on focal illumination from four to fifteen punctate, subcapsular opacities in the equatorial part of the lens. In one of the patients, who was seen again six months later, there was a decided decrease in their size and number, probably the result of the treatment. The author explains the appearance of the opacities by assuming a disturbance of nutrition of the vitreous accompanying the retinitis. Dantone.

Kamocki (110) has added to our meagre knowledge of the pathologico-anatomical changes in the eyes of diabetic persons by reporting four new cases from the clinic of Prof. Becker. He found the following conditions: beginning proliferation of the intracapsular cells, formation of vesicle-cells, and absorption of water with disjunction of the lamellæ of the nucleus, secretion of drops between the separated fibre layers, thus presenting the three successive phases of the formation of cataract. In one case he found sugar in the lens and in two in the vitreous. (Will be translated.—K.)

Kazaurow (111) had several failures as a result of the method previously recommended by him, in one case even secondary glaucoma. He therefore now makes the section in the upper sclerocorneal margin, opens the capsule as before with the cataract knife, removes the lens by pressure with the fingers, contracts the pupil with eserine, and leaves the first, aseptic, bandage undisturbed as long as possible. Among fifty-nine cases operated in this manner he had no failure. He thinks, however, that this method can be used only in cases of wide palpebral fissure and prominent eyes. HIRSCHMANN.

KNAPP'S (112) results in the 200 extractions are good in 90.5 % ; moderate, 5.5 % ; failure, 4 %. The histories of the failures are given in detail. Four of them were from primary suppuration of the wound. BURNETT.

MURRELL (113) places himself on record as in favor of treating cataract patients in well-lighted rooms, and with the lids closed only with strips of isinglass plaster, and attests his faith by reporting five cases which he has successfully treated by that method. BURNETT.

NOYES (114) reports a case of death after extraction. The operation was performed without an accident. The upper two-fifths of the cornea were divided at the limbus, and an iridectomy was performed. No unusual reaction. The patient died of debility and syncope on the fifth day. A series of sections was made in a vertical direction from one side to the other. They showed incarceration of the iris in the wound on one side. A number of photographs of the sections is added. From examining them it would seem that the healing of the corneal wound takes place with the greatest energy at the point nearest the supply of blood, and that it is assisted to a great extent by proliferation of the epithelium on the anterior surface of the cornea. The endothelium does not take part in the process of healing.

BURNETT.

RAMPOLDI (115), like Businelli, recommends depression of the cataract in patients in whom the success of the operation is very doubtful, especially in blennorrhœa of the lachrymal sac, from which infection of the wound must be feared almost with certainty. The author has performed this operation under such circumstances in four cases during the past year with good results.

DANTONE.

RAMPOLDI (116) instilled a few drops of a solution of salicylate of atropine into the eyes of two cataract patients on the sixth day after the operation, when the wound had not yet closed ; the next day panophthalmitis developed, which destroyed the eyes in spite of the most energetic antiphlogistic measures. DANTONE.

v. STEIN (117), while experimenting on the function of the cochlea in young guinea-pigs, observed the development of cataract twenty-four hours after the continuous action of vibrations of a tuning-fork, to which the animals were exposed in a box. The cataract was stellate, belonging partly to the anterior, partly to the posterior capsule, or posterior cortex, but disappeared spontaneously after a week, though the continuous vibrations of the tuning-fork did not cease.

XVI.—VITREOUS.

118. **Dujardin.** Hémorrhagie intermittente du corps vitré. *Journ. des sci. méd. de Lille*, 1887, No. 1, p. 145.

119. **Rolland.** Hémorrhagie générale du corps vitré ; ophthalmotomie ; guérison. *Rec. d'ophth.*, 1887, No. 1, p. 1.

Dujardin (118) reports the case of a man, into whose vitreous hemorrhages took place at irregular intervals, sometimes into one eye, sometimes into the other ; their cause could not be discovered. MARCKWORT.

Rolland (119) reports a case of traumatic hemorrhage into the vitreous. After being treated for two months the patient was still unable to distinguish any thing. Rolland then performed sclerochoriotomia posterior ; the next day the patient could count fingers, and continued to improve for two weeks, after which his sight remained unchanged. Galezowski 1 is read at 15 *cm.*

MARCKWORT.

XVII.—RETINA AND FUNCTIONAL DISTURBANCES.

120. **Darier, A.** Quelques observations de rétinite pigmentaire avec anomalies intéressantes. *Arch. d'ophth.*, vol. vii., No. 2, March–April, 1887, p. 170.

121. **Horstmann, C.** On anæsthesia retinæ as a symptom attending constitutional anomalies. *Zeitschr. f. klin. Med.*, vol. xii., 4, 1887.

122. **Mellinger, Carl.** A case of amblyopia due to quinine. *Zeh. klin. Monatsbl.*, vol. xxv., p. 57.

123. **Ostwalt, F.** Clinical remarks on commotio retinæ. *C. f. A.*, 1887, pp. 33 and 72.

124. **Pooley, Thos. R.** Left-sided homonymous hemianopsia. *N. Y. Med. Jour.*, Jan. 22, 1887.

125. **Siegheim, Max.** Contributions to the knowledge of ret-

initis pigmentosa, with special regard to the etiology. Inaug. Diss., Berlin, 1887.

126. TROUSSEAU. Les rétinites urémiques. *Gaz. hebd. de méd. et de chir.*, 1887, No. 5, p. 82.

DARIER (120) reports six cases of a typical retinitis pigmentosa. They occurred in five families, in which no blood-relationship existed, but in which he found among thirty-five childen eleven with hemeralopia. v. MITTELSTÄDT.

HORTSMANN (121) presents the clinical history of seven cases of anæsthesia retinæ, that disease the characteristic symptoms of which are the reduction of central vision and marked concentric limitation of the visual field, while the fundus appears normal. There were no distinct disturbances of accommodation, the pupils reacted promptly, and the action of the external muscles was normal. The visual disturbance manifests itself very gradually. The disease lasts a long time, but can be almost invariably cured by sparing the eyes, keeping out strong light, and giving tonics. It is of central origin, and always affects both eyes. Boys and girls before the age of puberty, and the female sex in particular, are predisposed.

MELLINGER (122) saw amblyopia produced by 15 grms. of quinine in a puerpera. The central blood-vessels were extremely contracted and the optic nerve subsequently became atrophic. Sight afterwards rose to $\frac{20}{70}$, but the visual field remained contracted above and below.

OSTWALT (123) observed five cases of commotio retinæ at Hirschberg's clinic, but could not verify the statement of Berlin, that eccentric vision was proportionally reduced, and that the haziness of the retina had no effect on the disturbance of vision, and therefore cannot accept Berlin's supposition that irregular astigmatism is the cause of the reduction of sight. He found, on the contrary, that the disturbance of central vision does not belong to the clinical picture of commotio retinæ, while the disturbance of eccentric vision is a constant symptom, as can be shown in the majority of cases of peripheric opacities of the retina, which must be due from the ophthalmoscopic appearance to a change in the retinal blood-vessels. There was no paresis of accommodation in these cases.

POOLEY'S (124) case was a man who had previously been under treatment for specific choroiditis. After exposure to cold wind he was seized with left-sided homonymous hemianopsia. Under large doses of iodides he made a recovery, the improvement in the defect beginning at the periphery of the horizontal median plane. BURNETT.

SIEGHEIM (125) draws conclusions from the observations of seventy-three cases of retinitis pigmentosa as to the etiology of the disease. He finds but little support for the theory of consanguinity, but rather considers heredity an etiological factor, while the pathological factor must be considered a disease, either hereditary or capable of being transmitted, of organs which have developed from the ectoderma.

TROUSSEAU (126) reports three cases in which retinitis albuminurica was observed before albumen appeared in the urine. He proposes the name retinitis uræmica instead of retinitis albuminurica. MARCKWORT.

XVIII.—OPTIC NERVE.

127. CASPAR, LEOPOLD. On coloboma of the optic nerve. Inaug. Diss., Bonn, 1887. A new case, with remarks.

128. DUFAUT. Contribution à l'étude du nerf optique à la suite de l'erysipèle de la face. *Union méd.*, 1886, No. 171, p. 1102. Report of a case.

129. FRIEDENWALD, A. A case of optic neuritis, with brain symptoms; recovery. *N. Y. Med. Jour.*, Feb. 5, 1887.

130. TILLAUX. Tumeur primitive du nerf optique. *Rec. d'ophth.*, 1887, No. 2, p. 65.

FRIEDENWALD (129) reports the case of a young girl of fourteen years who recovered from a severe attack of papillitis, most pronounced in the right eye, under the use of iodide of potassium. In the opinion of the author it is not possible in the majority of cases to make the diagnosis of severe intracranial trouble in these cases *ante mortem.* BURNETT.

TILLAUX (130) diagnosticated in a patient a tumor of the optic nerve. Exenteration of the orbit was performed and the diagnosis verified, the tumor proving to be a sarcoma. It continued along the optic nerve into the cranial cavity, because the cut, which divided the optic nerve just at the foramen, passed only through tumor. The first symptoms of the disease had been noticed eighteen month before. MARCKWORT.

XIX.—INJURIES (FOREIGN BODIES) AND PARASITES.

131. RAMORINO. Nota di un caso di traumatismo dell' occhio destro e corpo estraneo nel naso. *Boll. d'ocul.*, vol. ix., 2, Jan., 1887.

Ramorino (131) treated a patient suffering with panophthalmitis, who, two months previously, had been injured at the right inner canthus with a splinter flying from a machine for cutting wood. After the eyeball had been incised and the pus had escaped, shrinkage and relative recovery took place. Three months later the patient noticed a little abscess over the left nostril, after the bursting of which the point of a foreign body became visible. It was removed, and proved to be a splinter of wood 95 *mm* long and 20 *mm* wide, which, in the opinion of the author, had entered between the globe and caruncle without leaving any marked scar, had penetrated the inner wall of the orbit, and had been pushed from the hard left upper maxillary bone downward into the left nostril, where the point came out after one hundred and forty-five days. The wood, rotting in the nasal cavities, had produced a severe inflammation of the nasal mucous membrane which could not be explained, which had extended through the pharynx to the bronchial tubes, and had endangered the life of the patient. Curiously, the power of smell had not been impaired on either side. Dantone.

XX.—OCCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

132. Bettmann, Boerne. Connection between occular and nasal disease. *Jour. Amer. Med. Assoc.*, Feb. 19, 1887.

133. Féré. Troubles vasomoteurs de l'ataxie locomotrice. *Soc. de biol.*, séance du Janv., 1887.

134. Fournier. Diagnostic des paralysies de la troisième paire d'origine tabétique. *Rec. d'ophth.*, 1887, No. 3, p. 129.

135. Hun, Henry. A clinical study of cerebral localization. *Amer. Jour. Med. Sci.*, Jan., 1887.

136. Lagrange. Contribution à l'étude clinique des affections oculaires dans le diabète sucré. *Arch. d'ophth.*, vol. vii., No. 1, 1887, p. 65.

137. Morse, Clifton S. Asthenopia connected with and largely dependent upon uterine affections. *N. Y. Med. Jour.*, Jan. 22, 1887.

138. Ljabinsky. Iridocyclitis post febrem recurrentem. *Wjestnik ophth.*, 1886, No. 6, and 1877, No. 1.

139. Mazza. Lepra tuberculose ed anestetica lepra deformante e mutilante, tumori leprosi sclero-corneali, esportazione e cauterizzazione. *Ann. di ottalm.*, vol. xv., 5–6, p. 470.

140. Secondi. Sulla lepra oculare. *Ann. di ottalm.*, vol. xv., 5–6, p. 458.

141. Sinclair, Chas. F. The headache of youth and its relation to ocular defects. *Jour. Amer. Med. Assoc.*, Feb. 26, 1877.

Bettmann (132) believes that many affections of the eye are reflex manifestations of nasal troubles, and reports a case of constant epiphora which was cured by removing the hypertrophied tissue of the anterior portion of both turbinated bones.

Burnett.

Fournier (134) discusses the symptoms which distinguish the various paralyses of the oculomotor nerve from one another; the tabic paralyses of this nerve are almost always partial and frequently confine themselves to the pupil, while in paralyses not of tabic origin all the branches are usually affected. In tabic mydriasis the pupil contracts on accommodation, but does not respond to light. In tabes there is frequently myosis instead of the mydriasis which might be expected, which may be the only symptom or may be associated with paralysis of some muscle supplied by this nerve. Nothing similar is observed when tabes is not the cause. Tabic paralysis of the oculomotor nerve may last several weeks, days, or even minutes, and appears again after a while. While syphilitic paralysis of this nerve disappears slowly as a result of treatment, tabic paralysis is frequently cured spontaneously.

Marckwort.

In the first case reported by Hun (135) there was a defect in the lower left quadrant of the visual field of each eye. On post-mortem there was found an atrophy of the right cuneus. He also gives a case reported by Monakow, and from a study of these he infers: (1) That the optic fibres from the right upper quadrant terminate in the lower half of the right cuneus; (2) that those from the right lower quadrant terminate in the adjacent part of the right median occipito-temporal convolution; (3) that the lower half of the cuneus and the adjacent part of the median occipito-temporal convolution are the point of termination the optic fibres from the homonymous halves of the retina; (4) on the median surface of the occipital lobe take place those actions which are associated with simple visual sensations; (5) on the convex surface of the (left ?) occipital lobe take place those actions which are associated with complete visual perception and recognition.

Burnett.

Lagrange (136) briefly reports the clinical history of 27 cases and presents a review of the diabetic diseases observed at Badal's clinic, 52 cases among 20,000. Cataract and retinitis or chorioretinitis respectively, occurred most frequently, 13 cases. Next in order came ulcerous and pustular keratitis, 4 cases. Other complications were more rare—for instance, atrophy of the optic nerve, 3 cases; amaurosis without any ophthalmoscopic symptoms, and retinitis pigmentosa, 2 cases each; accommodative asthenopia, paralysis of the muscles (abducens), zona ophth., glaucoma, abscess of the lids, 1 case each. Three cases of iritis and serous iridochoroiditis and two of phlegmon of the orbit are worthy of note, one of the last-named ending fatally when it became complicated with phlegmon of the thigh. In the other case the patient recovered. In neither one of these two cases was there genuine suppuration, though the disease lasted a long time.

v. Mittelstädt.

Morse (137) relates five cases in which asthenopia was dependent upon organic uterine affection. He does not believe in the existence of a menstrual asthenopia independent of uterine disease. Burnett.

Ljabinsky (138) saw at the Kronstadt hospital, in the second half of the year 1885, an epidemic of relapsing fever, followed by the usual epidemic of iridocyclitis. The number of patients suffering with relapsing fever was 640; 22 of whom, or 3.4 per cent., became affected with iridocyclitis. The first cases of relapsing fever occurred in July, the first of iridocyclitis in September. The latter affection was not observed in any patient under 20, and never in a female (of whom 100 had relapsing fever). The interval between the last attack of fever and the first ocular symptom varied between 1 and 95 days. In all the cases the iritis was the most prominent feature and preceded the opacities of the vitreous, which never failed to appear.

Hirschmann.

Mazza (139) observed in a female leper aged twenty-eight a tumor the size of a pea at the sclero-corneal margin, which on removal proved to be a lepra-nodule. A firm scar formed after the little tumor had been excised a second time, the base being cauterized with the thermo-cautery of Paquelin. One of the numerous nodules covering the face of the patient was situated at the margin of the lower lid. Dantone.

Secondi (140) has seen ocular affections in five cases of leprosy during the twenty-five years he has practised at Genoa. In all of them the conjuuctiva and corneal margin were affected. In two cases, which lately came under observation, the disease had attacked both eyes in the course of a few months. The author gives their clinical history at length and a description of the microscopical appearance of the tissue. The bacillus of lepra was found in both cases in large numbers. By excising the nodule and cauterizing the base the infiltration could be prevented from extending, and after a firm scar had formed an iridectomy was done on all four eyes, giving them relatively good sight. DANTONE.

SINCLAIR (141) gives the history of three cases of persistent headache relieved by cylinders. BURNETT.

REVIEWS.

Reference Hand-Book of the Medical Sciences. Edited by A. H. Buck, M.D. Vol. v. Wm. Wood & Co., N. Y., 1887. (Sold only by subscription.)

The articles in the present volume of this exhaustive encyclopædia of medicine embrace some of the most important topics in ophthalmology. They are of varying excellence, but all worth reading by the general practitioner. Many are elaborate; too elaborate, in fact, for the character of the work in which they appear, and all are well illustrated by diagrams and other drawings. Space forbids that we should do much more than enumerate the different articles: Mydriatics are treated of by H. Gradle, who also contributes a long article on myopia and myotics. W. S Dennett tells about nystagmus, and John Green treats freely of the ophthalmoscope and ophthalmoscopy, with many diagrams and other illustrations, and a most excellent chromo-lithographic representation of the normal fundus copied from Jäger. W. O. Moore writes of the use of the ophthalmoscope in general medicine. If this paper had been longer and the preceding one shorter, the general practitioner, we think, would have been the gainer. Optic nerve and retina are by A. Alt. Optometry is considered at length by J. Green. The orbit's injuries and diseases are by G. C. Harlan; and W. H. Carmalt writes of panophthalmitis.

S. M. B.

On the Determination of the Necessity for Wearing Glasses. By D. B. St. John Roosa. (The Physician's Leisure-Hour Library.) Detroit, Michigan: G. S. Davis, pp. 73. Price 25 cents.

A very convenient little monograph for the practitioner who has no time to wade through the larger treatises. A very important and instructive chapter for the specialist is the one, " the value of glasses, and limitations in their value in relieving various symptoms." The author's views are conservative and supported by facts. The student will find it a very correct guide in general principles. We note, however, a slight want of clearness in the definition of astigmatism. Astigmatism is represented as being a condition in which the eyeball is too long or too short in one meridian. It is, of course, meant that the focal distance is too long or too short in one meridian. S. M. B.

Granular Lids and Contagious Ophthalmia. By W. F. Mittendorf, M.D. (The Physician's Leisure-Hour Library.) Detroit, Michigan : George S. Davis, 1886, pp. 110. Price 25 cents.

This is a very valuable little monograph for the general practitioner on a class of diseases with which he is almost daily brought in contact, and concerning which he should have accurate knowledge. Dr. Mittendorf gives this in a very concise yet orderly way. The specialist will also read it with interest, though he may find nothing specially new to him. We note one or two points for possible criticism. One is the absence of a sufficient consideration of hyperæmia of the conjunctiva, which is one of the most troublesome affections, both to the patient and physician, to which the conjunctiva is liable. The other is the rather vague and somewhat inaccurate description of " vernal catarrh," as he calls it. He says it appears as " a faint vascular swelling around the cornea," whereas the swelling, which is grayish in tone, has no appearance of vascularity, to ordinary inspection. The typography and " make up " of all the volumes in this series are good and tasteful. S. M. B.

MISCELLANEOUS NEWS.

Dr. H. C. Ferguson has been appointed lecturer on ophthalmology to the University of Dunedin, New Zealand. He has fifteen beds in the hospital and plenty of teaching material. He will furnish abstracts of Australasian ophthalmological literature for the reports in these Archives.

The paper entitled : " An Instrument for Testing Refraction and its Errors, the Strength of the Recti Muscles, and their Insufficiency," by WARD A. HOLDEN, M.D., published in the last number of these ARCHIVES (p. 295, etc.), received Prof. Seeley's ophthalmological prize at the Medical College of Ohio for the session of 1886–87.

Prof. GOSSELIN died April 3, 1887, in his seventy-second year.

GIRAUD-TEULON, the inventor of the binocular ophthalmoscope, and author of many valuable treatises, died, seventy-two years old, at Paris.

In celebration of the twenty-fifth anniversary of the foundation of the German Ophthalmological Society, an International Ophthalmological Congress will be held at Heidelberg, Aug. 9, 1888.

INDEX TO VOL. XVI.

Abadie, Cataract Extraction, 352
—— Incarceration of Iris, 352
—— Vitreous Hemorrhages in Young Men, 133
Adamück, School Refraction, 334
—— Trachoma, 342
Addario, Sarcoma, 119
Agnew, Cataract Extraction, 352
Albini, Color Perception of Retina, 331
—— Exenteration, 127
Albuminuria as Cause of Cataract, 483
Alcohol, Effects of on the Eyes, 366
Alexander, Clinique, 322
Alopecia Totalis, Cases of, 147
Alt, Atrophy of Optic Nerve, 358
—— Brain Tumor, 367
—— Diphtheritic Conjunctivitis, 471
—— Panophthalmitis; Enucleation, 110
—— Sympathetic Ophthalmia, 480
—— Trachoma Epidemic, 113
Alum, Dangers of, 119
Amaurosis, from Alcohol, 140
—— from Malaria, 141
—— from Sulphide of Carbon, 141
—— Total, of Both Eyes without Apparent Cause, 140
Amblyopia, after Stroke of Lightning, 242
—— Cases of Toxic, 140
—— from Malaria, 363
—— of Squinting Eyes, 349, 463
Amyloid in the Cornea of a Staphylomatous Eye, 313
Anatomy, Reports of, 89, 222, 328, 458
Anderson, Relapsing Neuritis, 135
Andrews, Electric Light, 331
—— Nitrate of Silver, 234
—— Trachoma, 343
Aniridia, Congenital, 346
Anke, Hemeralopia after Hemorrhage, 139
—— Traumatic Coloboma of Lids, 97
Anophthalmus, 89, 222
Anterior Capsule, Splinter on, 360
Anterior Chamber, Cyst of, 345
—— Hemorrhage into, 476
—— Prolapse of Retina into, 26
Antipyrine, 88
Antiseptic Questions, 85, 375, 459
ARLT, FERDINAND VON, Obituary Notice of, 370
Armaignac, Areolar Choroiditis, 478
—— Benign Conjunctivitis, 113
—— Cocaine and Eserine in Glaucoma, 125, 479
—— Naevi of Eye, 114
—— Suppurative Dacryo-Adenitis, 229
—— Thorn Thirty-two Years in Sclera, 476
Artificial Ripening of Cataracts, Method, 132
Asthenopia, 335
—— and Uterine Diseases, 145, 491

Astigmatism after Extraction, 132
—— Diagnosis of, with Ophthalmoscope, 85
—— in Glaucoma, 125
Atrophy after Erysipelas, 242
—— Cases of Cerebro-Spinal, 142
Atropine, Dangerous Sequences of, 485
—— Phenomenon Following Use of, 93
—— Santonate of, 222
Ayres, Cataract Treatment, 480
—— Lime on Cornea, 118
—— Pyramidal Cataract, 131
—— Retinitis Pigmentosa, 136
—— Sympathetic Ophthalmia, 480

Baas, Paresis of Accommodation after Parotitis, 245
Badal, Syphilitic Eye Diseases, 146, 245
Badal's Operation, 339
Baker, Cataract Extractions, 481
Bandage, an Aseptic, 327, 459
Barrett, Refraction in Mammals, 223
Basedow's Disease, Report on, 111, 340
Bayer, Clinique, 457
Behme, Galvano-Cautery, 235
Beljarminow, Graphic Representation of Curves of Intra-ocular Tension, 224.
—— Test Types, 87
Benedetti, Irideræmia aud Glaucoma, 349
Benson, Fibroma of Cornea, 474
—— Partial Embolism of Retinal Artery, 138
—— Trichiasis, 97
Berger, Prolapse of Retina into Anterior Chamber of the Eye Following Dislocation of the Lens into the Posterior Chamber, 26
—— Anatomy of Posterior Chamber, 463
—— Glaucomatous Excavation, 479
—— Iridocyclitic Anatomy, 478
—— Sympathetic Transmission, 480
Berger and Tyrman, Sphenoid and Ethmoid Labyrinth, 107
Bergmeister, Toxic Amblyopia, 140
Berry, Abducens Paralysis, 144
—— Corneal Ulceration, 117
—— Divergent Strabismus with Homonymous Diplopia, 102
Beselin, Amyloid in the Cornea of a Staphylomatous Eye, 313
Bettmann, Blindness after Hemorrhage, 139
—— Eye and Nose, 490
—— Hemorrhage into Anterior Chamber, 476
Bettremieux, Cataract Aphorisms, 131
—— Iridectomy in Detachment of Retina, 141
Birnbacher, The Cilio-Retinal Blood-Vessels, 32
—— Glaucoma, 238
—— Retro-Ocular Tumor, 109
Bjelow, Glasses, 95
Blanc, Paralysis of Motor Oculi, 337
Bland, Seat of Lesions in Paresis of Muscles, 105
Blennorrhœa, Treatment of, 472
Blindness, as Influenced by Intermarriage, 80
—— in Italy, 77
—— in Saltzburg, 79
—— in Young Persons, 218, 322
Bobone, Basedow's Disease, 340
Bock, Lachrymal Caruncle, 229
—— Ribbon Keratitis, 474
—— Vesicles of Cornea, 235
Boegel, Subconjunctival Lipoma, 114
Bogajeffsky, Popular Lecture, 217
Book Notices, 248, 368, 493
Borel, Hysterical Muscular Affections, 362
Boric acid, 344
Borthen, Essential Phthisis, 144, 244
Bouchard, Artificial Cataract, 481
Boucheron, Bacteriology of Chalazion, 99
Bradford, Case of Transplantation of the Rabbit's Eye, with Subsequent Enucleation, 182
Brailey, Ciliary Nerve Pathology, 347, 350

Brailey, Essential Shrinkage of Conjunctiva, 114
—— Interstitial Keratitis, 235
—— Sympathy Caused by Sarcoma, 238
—— Sympathetic Ophthalmia, 350
—— Unilateral Ophthalmoplegia, 338
Brain, Localization of Diseases in, 490
Braun, Text-Book, 217
Briggs, a New Instrument for Performing Optico-Ciliary Neurotomy, 37
Bright's Disease, Neuro-Retinitis in, 355
Britto, Complicated Extractions, 482
—— Injuries, 468
Brockmann, Recurrent Hemorrhage in Scurvy, 147
—— Tumor, 109
Browne, New Remedies, 461
—— Zonular Cataract, 352
Brugger, Keratitis, 235
Buchholtz, Sphincter Iridis, 226
Buck, Reference Hand-Book of Medical Sciences, 77
Bucklin, One Hundred Extractions, 352
Bull, Intra-Ocular Hemorrhage, 361
—— Retinitis in Bright's Disease, 355
Burchardt, Diphtheritic Conjunctivitis, 114
—— Phlyctenular Cocci, 474
Burnett, S. M., "A Theoretical and Practical Treatise on Astigmatism," Notice of, 249
—— Black Cataract, 482
—— Dioptry, 334
—— Lenses, 459
—— Ocular Affection with Mumps, 147
Businelli, Luxation of Lens, 482

Cant, Paralysis of Externi, 230
Capsule, Rupture of Anterior, 240
Carbon, Amaurosis from Poisoning with Bisulphide of, 141
Carl, Bandage, 459
Carl Theodore, duke, Pathology of Kidney Disease, 362
Carter, Malarial Amblyopia, 363
Caruncle, Pathological Anatomy of, 229
Caspar, Coloboma of Optic Nerve, 488
Castaldi, Epithelioma of Orbit, 340
Cataract, Artificial, 483
—— Artificial Maturation of, by Salt Solution, 132
—— Astigmatism after Extraction of, 132
—— Case of Nigra, 482
—— Cause of, Operation for, etc., 130
—— Due to Albuminuria, 483
—— Extraction of, without Iridectomy, 54
—— Flap-Operation for, 447
—— Following Lightning, 240
—— Maturation of, 240
—— Operations for Primary and Secondary, 253
—— Pyramidalis, 131
—— Reclination of, 435
—— and Nephritis, 240
Cautery, Use of the Actual, in Removal of Neoplasms from the Eye, 409
Central Blepharoraphy, 99
Cerebral Abscess Following Orbital Periostitis, 233
Chalazion, Bacteriology of, 99
Chancre of the Lids, 337
Changarnier, Amaurosis from Bisulphide of Carbon, 141
—— Croupous Conjunctivitis, 471
Charpentier, Intensity of Luminous Sensations, 92, 226
—— Retinal Adaptation, 226
Chase, Cyst of Iris, 477
Chaucel, Eserin, 345
Chevalier, Sympathetic Ophthalmitis, 238
Chevallereau, Gelatine Tablets, 220
Chiasma, Affection of, 140
—— Gumma of, 246
Chibret, Extraction without Iridectomy and with, 239
—— Extraction Astigmatism, 142

Chibret, Operating Lamp, 87
—— Panophthalmitis, 347
——Skiascopy, 82
Chisholm, After-Treatment of Extractions, 343
—— Cataract Extraction, 131
—— Cocaine and Glaucoma, 349
—— Iris in Vitreous, 134
Chodin, Thermometer in Ophthalmic Surgery, 483
Choked Disc in Cerebral Tumor, 243
Choroid, Coloboma of Choroid and Iris, 237
—— Congenital Atrophy of, 347
—— Nævus of, 347
—— Ossification of, 122
—— Metastatic Cancer of, 122
—— Reports on 122, 347, 478
—— Rupture of, 243
—— Sarcoma of, 479
—— Tuberculosis of, 348
Choroiditis Centralis, 122, 348
Ciaccio, Eyes of Diptera, 89
Ciliary-Body, Sarcoma of, 122
—— Muscle, Astigmatic Contractions of, 335
—— Comparative Anatomy of, 329
—— Irregular Contraction of, 465
—— Nerves, Pathology of, 347
—— Region, Injuries of, 244
—— Cilio-Retinal Blood-Vessels, 32
Clairborne, Capsular Advancement, 338
—— Peroxide of Hydrogen, 327
Cocaine as a Cause of Glaucoma, 349
—— Dangers from, in Glaucoma, 125
—— Use of, with Eserine in Glaucoma, 125, 205, 479
—— Notes on, 120, 346, 476
Coggin, Homatropine, 222, 327
Cohn, Eyes of Watchmakers, 227
Collins, Carbolic Acid, 471
—— Keratitis, with Ulceration, 478
Coloboma, Cases of Central, 356, 466
Colored Ring in Glaucoma, 125
Colors, 226, 331
Comparative Anatomy, 329
Conjugate Deviation, 363
Conjunctiva, Cornea, Sclera, and Anterior Chamber, Reports on, 112, 342
—— Essential Shrinkage of, 114
—— Pemphigus of the, 343
—— Polypus of the, 343
—— Tuberculosis of, 115, 343
Conjunctivitis, Acute Catarrhal, 117
—— Benign, 113
—— from Chrysophanic acid, 116
—— Diphtheritic, 114, 115, 471
—— Gonorrhœica, 116,
—— Lachrymal, 101
—— Periodic, 116
—— Rheumatic, 116
—— Various Types of, 234
Contagious Ophthalmia, 115
Copaiba in Gonorrhœal Ophthalmia, 328
Cornea, Anatomy of, 329
—— Blood-Vessels of the, 329
—— Conical, 118
—— Fibroma of, 474
—— Lepra-Nodule of, 491
—— Lymphatic Infiltration of, 119, 133
—— Perforating Ulcers of, 475
—— Removal of Lime from, 118
—— Sarcomatous Granuloma of, 215
—— Vesicles of, 235
Cornwall, Sympathetic Ophthalmia, 480
Corradi, Blindness in Italy, 77
Cortex Hemianopsia, 139
Coupland, Ophthalmoplegia, 338
Couturier, Phlyctenular Ophthalmia, 233
—— Iritis, 236
Crede's Method Superseded, 116
Crescent, Case of Inferior, 328
Critchett, Orbital Tumor, 340
—— Shrinkage of Conjunctiva, 114
Cross, Cystic Tumor of Iris, 236
Crosti, Glaucoma, 124
Croup of Conjunctiva, 234
Crouzefeyte, Enucleation, 469
Cuignet, Early Strabismus, 467
Cylindrical Lenses, 334
Cylindroma of Orbit, 470

Cyst of Iris, 477
Cysticercus, Extraction of, in Anterior Chamber, 142

Dacryocystitis, 101
Daguillon, Eczema after Extraction, 228
Dantziger, Massage in Leucomata, 118
Darkewitsch, Optic Nerve Centres, 330
—— Pupillary Fibres, 330
Darrier, Extirpation of Lachrymal Gland, 100
—— Retinitis Pigmentosa, 487
—— Trachoma, 114
Davidson, Death after Enucleation, 232
Deaf-Mutes, Eyes of, 79
De Beck, Chancre of Lids, 97, 336
Debenedetti, Sublimate, 471
Debierre, Hypertrophy of Lachrymal Gland, 100
Deeren, Double Exophthalmus, 106, 232
—— Malarial Amaurosis, 141
Delens, Symmetrical Orbital Tumors, 108
Dempsey, Orbital Aneurism, 340
Denissenko, Ocular Changes Caused by Light, 92
Dennett, Color Tests, 332
—— Perimeter, 327
Denotkin, Thermo-Cautery in Entropium, 466
Denti, Absence of Retinal Vessels, 330
Derby, H., Retinitis Pigmentosa, 356
—— R. H., Contagious Ophthalmia, 115
Dermoid Cyst of Orbit, 470
Despagnet, Hypodermatic Gold, 243
Destructive Ophthalmitis, 365
Deutschmann, Zonular Cataract, 239
Diabetes and Eye Diseases, 245, 484, 491
Diabetic Cataract, Spontaneous Disappearance of, 353
Dianoux, Enervation or Enucleation in Sympathetic Inflammation, 129
Dibble, Perimeter, 327
Dickinson, Pemphigus Conjunctivæ, 343
Dimmer, Ophthalmoscopy, 456
Dioptry *vs.* Dioptric, 334
Diphtheritis, Ocular Paresis Following, 106
Diptera, Eyes of, 89
Distichiasis, New Operation for, 177
Dobrotworsky, Military Trachoma, 234
Dobrowolsky, Peripheral Retinal Sensibility, 226
D'OENCH, Report of a Series of Five Hundred Successive Cases of Enucleation of the Eyeball, 187
—— Two Cases of Vertical Nystagmus, 291
Dolschenko, Cavernous Tumor of Orbit, 108
—— Superficial Keratitis, 118
Donders, Stereoscopy, 224
Dort, Artificial Cataract, 483
—— Death after Enucleation, 110
Dostojewski, Pupil Dilator in Mammals, 233
Dransart, Iridectomy in Retinal Detachment, 137
Duci, Transplantation, 83
Dufaut, Erysipelas and Optic Neuritis, 488
Dujardin, Ankyloblepharon, 97
—— Aspiration of Soft Cataract, 239
—— Vitreous hemorrhage, 486
—— Tumor of Orbit, 232
Dumont, Albuminuric Atrophy, 242, 244
—— Irido-Choroiditis, 228
—— Neuro-Retinitis, 138
—— Rupture of Sclerotic, 243
—— Traumatic Atrophy of Optic Nerve, 142
Van Duyse, Central Coloboma, 356
—— Persistent Pupillary Membrane, 122
Dynamite Injuries, 359
Eales, Unilateral Albuminuric Retinitis, 356

Eaton, Detachment of Retina, 356
Eckerlein, Pulsating Exophthalmus, 468
Ectropium, Cure of Spasmodic, 100
Edmunds, Optic Neuritis, 363
Education as a Cause of Myopia, 465
Electric Light, Hygiene of the, 331
Embolism, Partial of Retinal Artery, 138
Emerson, Etiology of Ocular Paralyses, 105, 324
Enervation or Enucleation, Discussion on, 129
Entropium, 336
—— Cautery in, 466
Enucleation, 469
—— Case of Traumatic, 341
—— Death Following, 232
—— in Panophthalmitis, 110
—— Report of Five Hundred Successive Cases of, 187
Epilepsy Cured by Enucleation, 128
Epileptics, Eye of, 368
Epiphora, Pharyngeal Affections as a Cause of, 246
Erysipelas, Optic Atrophy, Following, 242, 358
Eserine, 89, 125, 222, 479
Essential Phthisis of Eye, 144
Eversbusch, German Ophthalmology, 322
—— Thermo-Cautery, 118
—— Transplantation, 466
Evisceration, 129, 460
Ewetzky, Albuminuria and Cataract, 483
—— Cylindroma of Orbit, 469
—— Cysts of Lower Lid, 98
Exenteration, 127, 325
Exner, Aniso-Dioptric Cylinders, 224
—— Retinal Functions, 94
Exophthalmic Goitre, see Basedow's Disease.
Exophthalmus, Cases of, 232, 341
Exostosis of Orbit, 340
Externi, Insufficiency of, 338
—— Paralysis of Both, 230
Extraction Followed by Death, 485
Eye, Alterations Produced in the, by Light, 92
—— Anatomy of Motion of, 90
—— Temperature of, 93
Eye and Nose Diseases, 415

Falchi, Histogenesis of Retina, 91
Fano, Emphysema of Lids, 96
—— Iridectomy in Detachment of Retina, 356
—— Polypus of Conjunctiva, 346
Featherstonehaugh, Insufficiency of Externi, 338
Féré, Dynamogenic Visual Excitations, 224
—— Hysterical Amblyopia, 360
—— Locomotor Ataxy, 489
Fieuzal, Diphtheritic Conjunctivitis, 115
—— Hemorrhage after Extraction, 353
—— Laboratory, 79, 81, 219, 457
Flemming, Human Eye, 328
Foerster, Myopia, 95
Fontan, Tuberculosis of Conjunctiva, 343
Foreign Body, Long Presence of, in Sclera, 476
—— Remarkable Toleration of, 359
Fournier, Tabic Paralysis, 490
Fox and GOULD, "Compend. of Diseases of the Eye," Review of, 368
—— Color-Sense, 332
—— Heat- and Color-Sense, 332
—— Retinal Insensibility to Violet, 332
Francke, Galvano-Cautery, 474
—— Rupture of Choroid, 243
Friedenwald, Optic Neuritis, 488
Friedreich's Disease, the Eyes in, 144
Fromond, Cautery, 473
Frost, Conjugate Deviation, 363
—— Convergent Strabismus, 102
—— Ophthalmoplegia Interna, 334
Frothingham, Cocaine, 346
Fryer, Hot Water, 234, 344
Fuchs, Tuberculosis of Conjunctiva, 115
Gaillard, Phlebitis, 469

Galezowsky, Cocaine, 476
—— Conical Cornea, 118
—— Corneal Extraction, 130
—— Epilepsy Cured by Enucleation, 128
—— Inflammation of Both Lachrymal Glands, 229
—— Pelletièrine in Ocular Paralysis, 105
—— Sclero-Choriotomy, 126
—— Thermo-Cautery, 345
—— Unilateral Exophthalmos, 232
Gallenga, Bacteria, 458
—— Convergent Strabismus, with Incongruence of Retina, 338
—— Infectious Keratitis, 475
Galvano-Cautery, 235, 474
Gand, Sulphide of Carbon Amaurosis, 141
Gangrene as a Cause of Cataract, 130
Gardiner, Is the Position of Rest the Cause of Strabismus? 39
—— Tolerance of Foreign Bodies in the Orbit and the Eye, 207
Gayet, New Extraction Methods, 132
—— Symmetrical Orbital Tumors, 109
Gellé, Ophthalmotonometry, 84
Genkin, Ophthalmia Neuroparalytica, 145
Gepner, Sympathetic Œdema of Optic Nerve, 129
Germain, Strabismus, 102
Gifford, Eczematous Conjunctivitis, 115
Gilmore, Nasal Nerve Stretching, 478
—— Symblepharon, 98, 228
Glæssner, Iodol, 88
Glan, Complementary Colors, 227
Glasses in Balancing the Eyes, 95
Glaucoma, Astigmatism in, 125
—— Caused by Cocaine, 349
—— Caused by a Sting, 125
—— Cocaine and Eserine in, 125, 205
—— Contributions to the Knowledge of, 1
—— Dependent on Carious Tooth, 147
Glaucoma, Family History of Blindness from, 72
—— Iridectomy in, 126
—— Myotics in, 126
—— Pathogenesis, 440
—— Reports on, 123, 238, 348, 479
—— Sclero-Choriotomy in, 126
—— Sclerotomy in, 126
—— Simplex, Case of Double, in a Child of Eleven Years, 185
Glaucomatous Excavation, 479
Glioma, Anatomy of Retinal, 138
Gold, Hypodermatic Use of, and Potassium, 243
Goldzieher, Galvano-Cautery, 235
Gonella, Syphilitic Lens Opacities, 484
Gradenigo, Treatment of Leucoma with Incision, 118
Gradle, Ocular Symptoms Due to Nasal Diseases, 391
—— Periodic Conjunctivitis, 116
Graefe, Convergent Strabismus, 230
De Grandmont, Diminished Fusion a Cause of Strabismus, 103
—— Sublimate in Keratitis, 345
—— Tubercular Inoculation, 84
"Granular Lids and Contagious Ophthalmia," 494
Grasselli, Jequirity, 344
Green, Entropium, 336
—— Lenses of Asymmetrical Curvature, 87
Griffiths, Syphilis of Lids, 228
Groenouw, Prismatic Glasses, 86
Groicz, Panophthalmitis after Pterygium Operation, 112
Grossmann, Galvano-Cautery in Keratitis, 235
Gruening, Nasal Diseases and Eye Affection, 146
—— Tumor, 363
Guaita, Asepsis and Antisepsis, 85
—— Cocaine Therapeutics, 120
—— Evisceration, 129
—— Exostosis of Orbit, 340
—— Operating Bed, 87
Guiot, Atrophy of Disc from Maxillary Sinus, 142

v. Gudden, Localization of Functions, 226
Gumma of Chiasma, 245
—— Intraocular, 246
Gunn, Amblyopia, 364
—— Scopoline, 431
Gunning, Ripening of Cataracts,

Haab, Ophthalmoscopic Sketch-Book, 79
—— Retinitis Syphilitica, 137
Haase, Pulsating Exophthalmos, 232
Heck, Basedow's Disease, 111
Haensell, Hardening the Eye, 328
—— Microtome, 223
—— Sarcoma of Ciliary Body, 122
—— Vitreous Body, 91, 464
Haltenhoff, Clinique, 81
Harlan, Thrombosis of Retinal Vessels, 357
Hartridge, Tobacco Amblyopia, 357
Hay, Combination of Two Cylindrical Lenses, 327
Haynes, Copaiba Balsam in Ophthalmia, 328
Headache from Eye Affections, 364
—— Relieved by Cylinders, 492
Heart Disease Associated with Eye Affections, 366
Heat as a Cause of Cataract, 130
Heddaeus, Reflex Action of Pupil, 94
Helmholtz, Physiological Optics, 93
Hemianopsia, Case of Bi-Temporal, 358
—— Corticalis, 139
—— Homonymous, 487
Hemorrhage, after Extractions, 353
—— Blindness Following, 139
—— Hemeralopia Following Severe, 139
—— into Vitreous, 133
—— Intraocular, 361
—— Note of a Case of Intraocular, from a Fall on the Occiput, 35
Hereditary Blindness from Glaucoma, 72
Herpes Zoster, 338
Heterochromia of Irides, 346
Highmore's Antrum, Abscess of, 467, 470
Hinde, Herpes Zoster, 338
Hippel, Dynamite Injuries, 359
Hirschberg, Aseptic Bandage, 327
—— Cerebral Tumor, 245
—— Congenital Syphilitic Eye Diseases, 137
—— Diabetes, 245
—— Glaucomatous Rainbow, 125
—— Retro-Ocular Sarcoma, 109
—— Serous Cysts of Iris, 236
—— Strabismus, 103
—— Syphilitic Retinitis, 137
Hobby, Fatal Case of Panophthalmitic Enucleation, 111
Hoeltzke, Atropine, 461
Hoffmann, Sympathy Cured without Enucleation, 128
HOLDEN, An Instrument for Testing Refraction and Its Errors, the Strength of the Recti Muscles and Their Insufficiency, 295, 403
Holmes, Foreign Body in Cornea, 472
—— Intraocular Tumor, 479
Holmfeld, Jequirity, 343
Holt, Detachment of Retina, 357
Homatropina, Prolonged Action of, 222
Horner, Johann Friedrich, Necrology of, 251
HORSTMANN, Obituary Notice of v. Arlt, 370
—— Anæsthesia Retinæ, 487
Hotz, After-Treatment of Extraction, 353
HOWE, Family History of Blindness from Glaucoma, 72
—— Transplantation of Rabbit's Eye, 325
Hubert, Electrolysis, 119
Hun, Cerebral Localization, 490
Hutchinson, Blood Theory of Reflex Ophthalmitis, 238
—— Pupil Symptoms, 477
Hydrogen Peroxide in Ocular Therapeutics, 327
Hyoscine Hydrochlorate, 462
Hysterical Disturbances, 364

Imbert, Decentred Lenses, 91
Infratrochlearis, Stretching of 105, 339
Injuries, Foreign Bodies, and Parasites, Reports of, 142, 243, 358, 488
Inouye, Sclerotomy in Staphyloma, 119
Instruments and Remedies, 86, 221, 328, 459
Insufficiency, Nomenclature for, 339
Intensity of Luminous Sensations, 226
Intermarriage and Blindness, 80
Interni, Instrument for Testing Insufficiency of the, 295, 408
Iodol, 88, 344
Iridectomy in Retinal Detachment, 137
Irideræmia and Glaucoma, 349
Iridocyclitis Due to Fever, 491
Iridotomy, 478
Iris, Congenital Anomalies of, 122, 346
—— Cyst of, and Galvano-Cautery, 210
—— Cystic Tumor of, 236, 477
—— Incarceration of, 352
—— Melano-Sarcoma of, 237
—— New Formation of Pigment on Front of, 237
—— Rents in Sphincter of, 243
—— Reports on, 121, 236, 346, 477
—— Serous Cysts of the, 236
Iritis Syphilitica, 237
Iskersky, Military Trachoma, 234
Ivanoff, Inequality of Pupils, 464

Jaborine, Action of, 222
Jackson, Cylindrical Lenses, 335, 460
—— Eye Headache, 364
—— Ophthalmoscope, 327
—— Shadow Test, 326
Jacobson, Cataract Operations, 353
—— Glaucoma, 349
Javal, Glaucoma after Use of Cocaine, 127, 238
—— Muscular Insufficiency, 103
Jeaffreson, Lead Neuritis, 364
Jequirity, 344
Jessop, Tubercle of Iris and Choroid, 236
Juler, Electric-Light Ophthalmoscope, 87
—— Orbital Tumor, 340
—— Shrinkage of Conjunctiva, 114

Kahn, Monocular Fixation, 226
Kalt, Strabismus, 102, 230
Kaltenbach, Ophthalmia, Prophylaxis, 116
Kamocki, Diabetic Eyes, 244, 484
—— Hyaline Degeneration of Conjunctiva, 116
Kazaurow, Antipyrine, 88
—— Antiseptic Extractions, 239
—— Extraction, 484
—— Iodol, 344
Keall, Evisceration, 460
Keratitis Bullosa, 235
—— Interstitialis, 235
—— Superficial Vascular, 118
—— Sympathetica, 119
Kerschbaumer, Blindness in Saltzburg, 79
Kidney, Disease of, with Ocular Diseases, 145, 362
Kipp, Clinique, 81
Klein, Text-Book, 79
Knapp, Advancement of Tenon's Capsule, 229, 339
—— Cataract Extraction without Iridectomy, 54, 353
—— Dioptry, 334
—— Pyogenic Micro-Organisms, 220, 325
—— 9th and 10th Series of 100 Extractions, 485
Knies, Lightning Injury, 359
—— Myopia, 227
Koller, Peculiar Dioptric Images, 224
—— Visual Field, 93
Kollock, Oculo-Motor Nerve Paralysis, 339
Korrussewitsch, Vision of Marines, 217
Kroll, Stereoscopic Pictures, 327
Krueckow, Primary Melano-Sarcoma of Iris, 237
Krueger, Cautery, 236
Kubli, Petersburg Clinique, 458

Lachrymal Apparatus, Reports on, 100, 229, 467
—— Fistula, 467
Lachrymal Gland, Extirpation of, 100 487

—— Hypertrophy of, 100
Lachrymal Gland, Sarcoma of, 341
Lagrange, Badal's Operation, 221
—— Diabetic Eye Diseases, 491
Laker, Glaucomatous Experimentation, 125
Lamberg, Anomaly of Iris, 346
Lamps for Operating, 87
Landesberg, Acute Retrobulbar Neuritis, 243
—— Anomalies of Iris, 346
—— Congenital Anomalies, 328
—— Congenital Atrophy of Choroid, 347
—— Iridectomy in Single Glaucoma, 126
—— Lanoline, 89
—— Rupture of Anterior Capsule, 240
—— Sclerotomy in Glaucoma, 126
—— Traumatic Cataract, 240
Landolt, Instruments, 86
—— Tenotomy, 103
Landouzy, Exophthalmic Goitre, 469
Lang, Congenital Aniridia, 346
—— Myotics, 222
—— Refraction in Mammals, 226
Lange, Spontaneous Clearing Up of Cataracts, 358
Lanoline, 89
Lawrentjeff, Congenital Anomalies of Iris, 122
—— Modification of Extraction, 131, 353
Lawford, Nævus of Choroid, 347
—— Optic Neuritis, 363
Lead, Neuritis from Poisoning by Lead, 364
Leber, Cysticercus, 142
Lens, Dislocation of, 26
—— Luxation of, 482
—— Reports on, 129, 239, 350, 481
—— Steel in, 360
—— Subluxation of, 259
Lenses, Properties of, 459
Leprosy, Corneal Affection in, 491
—— of Eye, 145
Leroy, Ophthalmometer, 36
Lescynsky, Leucorrhœa and Purulent Ophthalmia, 113
Leucomata, Massage in, 118
—— Treatment with Incision, 118
—— with Electrolysis, 119
Licharewsky, Dermoid Cyst of Orbit, 470
Lichtwitz, Hysterical Disturbances, 365
Lid, Abscess of Lower, 467
—— Chancre of the, 336
—— Cocaine in Operations on the, 477
—— Coloboma of All the, 466
—— Cysts of, 98
Lids, Reports of Diseases of, 96, 228, 336, 465
—— Traumatic Coloboma of, 97
Lightning, Injuries from, 359
—— Stroke of, followed by Cataract, 240
—— by Amblyopia, 242
Linde, Cautery, 474
Linnartz, Eyes of Deaf-Mutes, 79
Lipoma, 114
Literature, Report of, 77, 217, 322, 456
Ljabinsky, Iridocyclitis and Fever, 491
Localizing Ocular Paralysis, 105
Logetschnikow, Blennorrhœa, 472
—— Trachoma Coccus, 472
Loring, Dioptric, 334
De Luca, Visual Eclipse, 135
Lucanus, Ophthalmoplegia Externa, 105
Luminous Sensations, Intensity of, 92
Lundy, Glaucoma from a Bee Sting, 125
Lupus of Lids, 467
Lymphangioma of Orbit, 233

MacBurney, Orbital Aneurism, 107
Macklakoff, Peroxide of Hydrogen, 461
Maddox, Convergence and Accommodation, 333
Magnus, Alopecia Totalis, 147
—— Blindness of Youth, 217
—— Empyæma of Frontal Sinus, 232
—— Transient Amaurosis, 140

Maher, Basedow's Disease, 111
Malarial Amblyopia, 363
Mammals, Refraction in, 223
Mandet, Variolous Ophthalmia, 244
Mangin, Electric Light, 87
Manz, Metastatic Cancer of Choroid, 123
Marie, Periodical Ocular Paralysis, 105
Martin, Astigmatic Contraction of Ciliary Muscle, 335
—— Corneal Astigmatism in Glaucoma, 125
—— Irregular Ciliary Contractions, 465
—— Rheumatic Conjunctivitis, 116
Masselon, Metrical Test-Types, 36
—— Sclerotomy in Glaucoma, 126
Maufrais, Serpentic Ulcer, 475
Mauthner, Paralysis of Ocular Muscles, 231
May, Transplantation of Rabbit's Eye into the Human Orbit, 47, 84
Mazza, Lepra Nodule of Cornea, 491
Meibomian Glands, Regeneration of, 90
Mellinger, Orbital Phlegmon, 470
—— Quinine Amblyopia, 487
Meyer, "A Practical Treatise on Diseases of the Eye," Notice of, 248
Meyerhofer, Cataract after Lightning, 240
—— Clinique, 81
—— Heat as a Cause of Cataract, 130
—— Maturation of Cataract, 240
Michel, Egyptian Ophthalmia, 113
—— Temperature of Eye, 93
Micro-Organisms, 220
Migraine, Paralysis in, 366
Milles, Sympathy Caused by a Sarcoma, 238
v. Millingen, Affection of Chiasma, 140
Millikin, The Actual-Cautery in the Removal of Neoplasms from the Eye, with a Case, 409
—— Homonymous Hemianopsia, 357
Minor, Boric Acid Powder for Granular Lids, 233, 344
—— Sympathetic Ophthalmia, 480
—— Tobacco Amaurosis, 141
Miscellaneous Notes, 147, 251, 494
Mittendorf, "Granular Lids and Contagious Ophthalmia," Review of, 494
Molluscum Contagiosum, 336
Moll, Injuries of Ciliary Region, 244
Molluscum, Epidemics of Contagious, 336
Monocular Limitation, 226
Montanelli, Dacryocystitis, 101
Moore, Albuminuric Retinitis, 145
Morano, Congenital Anophthalmus, 89
—— Lachrymal Strictures, 101
—— Uveitis, 121
Morelli, Hydatid Cyst of Orbit, 340
Morrison, Strabismus with Choroidal Atrophy, 102
Morse, Uterine Asthenopia, 49
Motais, Anatomy of Ocular Motion, 90
—— Strabotomy, 102
—— Suction of Cataract, 240
Mumps, Affection of Eye during the, 147
Murell, After-Treatment of Extractions, 485
—— Foreign Body Ten Years in the Eye, 359
Muscles, Anomalies of the Ocular, 149
—— Hysterical Affections of, 362
Muscles and Nerves, Reports on, 101, 229, 337, 467
Muscular Equilibrium, Congenital, 105
Muscular Insufficiency, 103
Myopia and Education, 465
—— Foerster's Theories Concerning, 95
—— Prevention of, 96

Nævi, 114
Nasal Nerve, Stretching of the, 478
"Necessity for Wearing Glasses," Review of, 498

NEESE, Contribution to Tuberculosis of Eye, 434
Negroes, No Trachoma in, 80
Neoplasms, Removal of, by Means of Cautery, 409
Nettleship, Albuminuric Retinitis of Pregnancy, 241
—— Central Chorio-Retinitis, 241
—— Central Choroiditis, 348
—— Commotio Retinæ, 241
—— Destructive Ophthalmitis, 365
—— "Diseases of Eye," 456
—— Erysipelatous Atrophy, 242
—— Glaucoma, 238
—— Meningitis After Enucleation, 111
—— Myopia from Childhood, 227
—— New Formation of Pigment on Front of Iris, 237
—— Spontaneous Disappearance of Diabetic Cataract, 252
—— Syphilitic Iritis, 237
—— Syphilitic Retinitis, 241
—— Unsymmetrical Nystagmus, 330
—— Vision in Detached Retina, 357
Neuritis, Path of, 363
—— Relapse in, 135
—— Rheumatic Retrobulbar, 142
Neuro-Retinitis with Shoulder Atrophy, 366
New York Ophthalmic and Aural Institute, 324
Nicotinic Amaurosis, 140
NIEDEN, Alopecia Totalis, 147
—— Dyslexia, 244
—— On the Connection between Diseases of the Eye and Nose, 146, 415
Noises as a Cause of Cataract, 485
Norris, Asthenopia, 335
Norton, Malignant Tumors of Lid, 98
Nose, Diseases of, with Ocular Affections, 146, 391, 490
Noyes, Antiseptics, 85
—— Fatal Extraction, 485
Nutrition of Eye, 461
Nystagmus, Two Cases of Vertical, 291
Ocular Affections in Constitutional Disease, Reports on, 143, 244, 360, 489
Oculo-Motor Nerve Paralysis, 339
Oldham, Double-Focus Lenses, 459
Oliver, Color Tests, 332
—— New Series of Wools, 221
—— Test-Types, 336
—— The Eyes in Friedrich's Disease, 144
Operating Bed, 87
Ophthalmia Neonatorum, 345
—— Neuro-Paralytica, 145
Ophthalmo-Malacia, 144
Ophthalmoplegia, 338
—— Interna, 334
—— Unilateralis Totalis, 338
Ophthalmoscope, Electric Light, 87
Ophthalmoscopic Sketch-Book, 79
Ophthalmoscopy, 80
Oppenheim, Gumma of Chiasma, 246
Optic Nerve, Atrophy of, 358
—— Atrophy of, after Erysipelas, 358
—— Atrophy of, from Cerebro-Spinal Causes, 142
—— Atrophy of, from Injury, 142
—— Reports on, 141, 142, 358, 488
—— Sympathetic Œdema of, 129
—— Traumatic Atrophy of, 102
—— Tumor of, 488
—— Centres, 330
Optic Neuritis, 488
Optic Papilla, Gun-Cap in, 360
Optico - Ciliary Neurotomy, Instrument for Performing, 37
Orbit, Antisepsis in Operations within the, 112
—— Cavernous Tumor of, 108
—— Cylindroma of, 469
—— Phlegmon of, 470
Orbit and Neighboring Cavities, 106, 231, 340, 468
Ostwalt, Commotio Retinæ, 487

Panas, Amaurosis, 361
—— Fluorescine Experiments, 461
—— Myotics, 126
—— Ptosis Operation, 98
—— Serous Cysts of Orbit, 470

Panas, Syringe, 211
Pannus, Curious Disappearance of, 366
Panophthalmitic Enucleation, 110
Panophthalmitis, 347
Paralysis, Abducens, 104
—— Ætiology of, 231, 324
—— Cases of Periodical Ocular, 105
—— from Migraine, 366
—— of Oculo-Motor Nerve, 337
—— Various Types of, 104
Parinaud, Periodical Ocular Paralysis, 105
Parotitis, Paresis of Accommodation after, 245
Pasternatzky, Width of Pupils, 365
Pathology, Report of, 82, 220, 325, 448
Pelletièrine in Ophthalmology, 105
Peltesohn, Cerebro-Spinal Atrophy, 142
Pemphigus, 343
Perimeter, 327
Perlia, Rheumatic Retrobulbar Neuritis, 142
—— Ring-Scotoma, 134
Peroxide of Hydrogen, 481
Persistent Pupillary Membrane, 122
Petrolacci, Ataxic Epiphora, 229
Pflueger, Cocaine Opacities, 120
—— Myopia and Education, 465
Philipsen, Ocular Investigations, 224
Phlyctenulæ, Bacterium of, 234, 474
Physiology, 91, 223, 331
Picque, Anomalies of Eye, 220
Pier D'Houy, Advancement, 103
—— Transplantation, 83
Pincus, Corneal Staphyloma, 475
Pinto, Microscopy of Retinal Glioma, 138
—— Ulcers, 475
Podwisotzky, Meibomian Glands, 90
Polypus of Conjunctiva, 343
Poncet, Chalazion, 99
—— Pathology of Corneal Granulations, 119
Pooley, Homonymous Hemianopsia, 487
—— Uterine Disease and Asthenopia, 145
Posterior Chamber, Anatomy of, 463
Power, Black Cataract, 361
Pregnancy, Albuminuria of, 357
—— Albuminuric Retinitis of, 341
—— Retinal Hemorrhages during, 139
PRENTICE, "Treatise on Simple and Compound Ophthalmic Lenses," Review of, 368
Preparations, Method of Hardening, 328
Prœbsting, Conjunctiva in Man and Ape, 329
Prœlss, Affection of Cervical Sympathetic, 246
Prolate Lenses, 88
Prout, Anomalous Formation in Vitreous, 354
—— Badal's Operation, 339
—— Lachrymal Conjunctivitis, 101
Pterygium, Operating for, Followed by Panophthalmitis, 112
Ptosis, Operation for, 98
Puncta, Congenital Absence of all Four, 101
Pupillary Fibres, 330
Pupils, Inequality of, 464
—— Reflex action of, 94
—— Reflex Immobility of, 84, 144
—— Width of, 365
Pyramidal Cataract, 131

Quinine Amblyopia, 487

Rabbit's Eye, Transplantation of, into the Human Orbit, 47, 83, 182, 344
Radziszewski, Anophthalmus, 222, 245
Ramorino, Injury of Eye, 489
Rampoldi, Abnormally Low Tension, 124
—— Atropine Phenomenon, 93
—— Capillary Lachrymal Fistula, 467
—— Congenital Lack of Equilibrium, 105
—— Dangers of Atropine, 485
—— Eye Disease with Heart Disease, 366

Rampoldi, Geography of Blindness, 218
—— Glaucoma, 349
—— Iridectomy in Sympathetic Ophthalmia, 128
—— Jaborine, 222
—— Lid Operations, 99
—— Lymphatic Infiltration of Cornea, 119, 133
—— Mydriasis, 477
—— Neuro-Retinitis, 366
—— Ocular Leprosy, 145
—— Optic Atrophy, 358
—— Pannus, 26
—— Reclination of Cataract, 485
—— Stretching of Infratrochlearis, 105
—— Sublimate, 462
—— Tuberculosis of Conjunctiva, 116
Randall, Crescent below, 329
—— Cylindrical-Lens Ophthalmoscope, 327
Randolph, Glaucoma Simplex (on Both Sides) in a Child Eleven Years of Age, 185
Rava, Washing of Lachrymal Sac, 101
Recti, Instrument for Testing Strength of the, 295
Rectus, Traumatic Division of Internal, 468
Redard, Dental and Ocular Affections, 147
"Reference Hand-Book of the Medical Sciences," 493
Refraction, Instrument for Testing the, and its Errors, 295
Refractive Media, 330
Reich, Trachoma, 490
Remak, Post-Diphtheritic Paresis, 106
Remedies, 88, 327, 460
Renton, Orbital Periostitis, Followed by Cerebral Abscess, 233
Retina, Absence of Vessels in the, 330
—— Adaptation of, 226
—— Anæsthesia of, 487
—— Color-Perception of, 331
—— Commotion of, 241, 487
Retina, Congenital Anomalies of, 242
—— Cure of Detachment of, 137
—— Functions of, 94
—— Glioma of, 138
—— Iridectomy in Detachment of, 137, 241
—— Prolapse of, into Anterior Chamber, 26
—— Sensibility of Periphery of, 227
—— Thrombosis of, 357
—— Treatment of Detachments of, 356, 357
Retina and Functional Disturbances, Reports on, 134, 240, 355, 486
Retinitis, Albuminuric of Pregnancy, 241
—— Central, with Choroiditis, 241
—— Pigmentosa, 136, 356, 487
—— Syphilitica, 137, 241, 484
—— Unilateral Albuminurica, 356
—— without Albumen, 358
Reuling, Cyst of Iris Destroyed with the Galvano-Cautery, 210
—— Granuloma Sarcomatosum Corneæ, 215
—— Syphiloma at Sella Turcica, with Engorged Papilla, 212
v. Reuss, Absence of Puncta, 101
—— Congenital Anomaly of Optic Nerve, 243
—— Congenital Anomalies of Retina, 242
Reviews, 248, 368, 493
Reymond, Measuring Strabismus, 102
Du Bois-Reymond, Visual Unity and Angle, 224
Reynolds, Cataract Extraction, 354
—— Prolate Lenses, 88
Rhein, Tuberculosis of Conjunctiva, 116
—— Ribbon Keratitis, 474
Richet, Cicatricial Ectropium, 229
—— Sarcoma of Lachrymal Gland, 341
Richey, Eserine in Glaucoma, 125
Risley, Albuminuria of Pregnancy, 357
Robertson, Central Blepharoraphy, 99

Robinowitsch, Cysticercus in Anterior Chamber, 236
Rodionow, Phlyctenular Bacterium, 234
Rohmer, Antisepsis, 459
—— Maturation of Cataracts, 240
—— Panophthalmia, 325
—— Sympathetic Keratitis, 119
—— Traumatic Enucleation, 341
—— Vitreous Hemorrhage, 488
Roosa, Convergent Squint, 103
—— "Determination of Necessity of Glasses," 498
Rosenmeyer, Diphtheritic Disturbances of Vision, 104
Rothziegel, Cataract and Nephritis, 240
Rouquette, Granular Conjunctivitis, 473

Salterain, Electricity in Ocular Therapeutics, 231
Samelsohn, Clinique, 81
Santos, Fernandez, Contributions, 457
Sarcoma, Retro-Ocular, 109
SARGENT, Elizabeth, Cocaine in Glaucoma, 205
SCHAPRINGER, Note of a Case of Intraocular Hemorrhage Caused by a Fall on the Occiput, 35
Schenkl, Clinique, 81
SCHIELE, On Co-Excitation in the Regions of Homonymous Visual Fields, 317
Schiess-Gemuseus Clinique, 82
—— Detachment of Vitreous, 458
Schiff, Nutritive Troubles of the Eye, 325
Schleich, Epileptics' Eyes, 366
Schmidt, Trachoma, 478
Schmidt-Rimpler, Speculum, 88
—— Text-Book, 79
SCHNABEL, J., Contributions to the Knowledge of Glaucoma, 1
Schneller, Myopia, 227
—— Trachoma Forceps, 86
Schoebl, Carcinoma of Cornea, 235
—— Lymphoid Chancroid, 228
—— Vessels of Cornea, 329
Schoen, Zonula, 330
School Children, Eyes of, 95
Schools, Refraction in the, 334
Schtschepkin, Carbolic Acid in Trachoma, 344
Schubert, Cocaine, 121
—— Head in Writing, 92
Schumann, Antiseptics, 459
Schwabe, Eyes of Children, 95
SCHWEIGGER, Enucleation and Exenteration, 325
—— The Operations for Primary and Secondary Cataracts, 253
—— The Return to the Flap-Operation, 447
Sclera, Melano-Sarcoma of, 119
—— Puncture of, in Glaucoma, 479
—— Thorn in, 476
Scleritis, Traumatic Purulent, 476
Sclero-Choriotomy in Glaucoma, 126
Sclerotomy in Glaucoma, 126
Scopoline, 461
Scurvy, Recurrent Hemorrhage in, 147
Secondi, Leprous Eye Affections, 491
—— Strabismus, 468
Seguin, Cortex Hemianopsia, 13
Serous Cysts of Orbit, 470
Serpentic Ulcer, 475
Sewell, Color Tests, 333
Shadow Test, 326
Siegheim, Retinitis Pigmentosa, 437
Simi, Clinique, 322
—— Extirpation of Lachrymal Gland, 467
—— Glaucoma Operation, 479
Sinclair, Headaches, 492
Sinkler, The Eyes in Friedreich's Disease, 144
Skiascopy, 82, 326
Skrebitzky, Blindness in Russia, 78
Smith, E., Transplantation, 344
Smith, G. M., Contagious Ophthalmia in Institutions, 113
Smith, Priestley, Lamp, 87
—— Prevention of Myopia, 96
—— Tonometer, 460
SMITH, W. F., A New Operation for Distichiasis, or Entropion, with the Record of a Few Cases, 177

Snell, Blindness Investigations, 322
—— Migraine Paralysis, 366
—— Orbital Nævi, 232
—— Retinitis Pigmentosa in One Family, 136
—— Sixteen Blind Families, 322
—— Splinter on Anterior Capsule, 360
Soederbaum, Blennorrhœa Neonatorum, 473
Specula, 88
Sphenoid Cavity, Diseases of, 107
Staderini, Traumatic Purulent Scleritis, 476
Standish, Alcoholic Amaurosis, 140
—— Alcoholic Paralysis, 337
Staphyloma of Cornea, 475
—— Sclerotomy in, 119
Statistical Papers, 80, 219, 323, 447
Steffan, Clinique, 219
—— Myopia in Schools, 96
v. Stein, Cataract Due to Sounds, 485
Stereoscopic Pictures, 327
Stellwag, Ophthalmological Papers, 80
STEVENS, Insufficiency Nomenclature, 339
—— The Anomalies of the Ocular Muscles, Hyporphoria, 149
STILLING, Pathogenesis of Glaucoma, 440
Stoelting, Tuberculosis of Conjunctiva, 234
Story, Zonular Cataract, 354
Strabismus, Amblyopia of, 339, 468
—— Divergent with Homonymus Diplopia, 102
—— Does Position of Rest Cause, 39
—— Theories of Convergent, 230, 467
—— with Incongruence of Retina, 338
Straub, Glioma of Retina, 133
Strawbridge, Cataract Extractions, 354
Struempell, Binocular Progressive Ophthalmoplegia, 106
Sublimate, 345, 462, 471
Suckling, Ophthalmoplegia, 106
Symblepharon, 98, 228
Symmetrical Orbital Tumors, 108
Sympathetic Keratitis, 119
Sympathetic Nerve, Affection of, 246
Sympathetic Ophthalmia, Evisceration in, 129
—— Discussion on Enucleation or Enervation in, 129
—— Iridectomy in, 128
—— Relieved without Enucleation, 128
—— Reports on, 127, 238, 350, 480
Syphilis, Cases of Congenital, in the Eye, 137
—— Eye Diseases during, 145
—— Manifestations of, in Eye, 245
—— Results of Inherited, 246
Syphilitic Lesions of Lids, 228
—— Retinitis, 137
Syphiloma at Sella Turcica, 212
Syringe for Washing Out Anterior Chamber, 221

Tabes, Paralysis from, 490
Tansley, Acute Choroiditis, 122
Teeth, Affections of, Causing Asthenopia, 147
Teillais, Malarial Amaurosis, 141
—— Retinal Hemorrhages in Pregnancy, 139
Temperature of Eye, 93
Tenon's Capsule, Advancement of, 438
Tension, Abnormal Decrease of, 124
—— Graphic Representation of Curves of Intraocular, 224
Tepljaschin, Clinique, 219
Terrier, Transplantation, 83
Test-Types, Accuracy of, etc., 87, 336
Text-Books, 79
Theobald, Amblyopia of Squinting Eyes, 230, 339
Thermo-Cautery, 118, 345, 466
Thermometry in Ophthalmology, 482
Thiery, Iodoformed Oil, 471
Thompson, Dangers of Alum Collyrium, 119
—— Exophthalmus, 341

Tillau, Tumor of Optic Nerve, 488
Tipton, No Trachoma in Negroes, 80
Tobacco Amaurosis, 140
Trachoma, and Nasal Catarrh, 117
—— Carbolic Acid in, 344
—— Chromic Acid in, 114
—— Coccus, 472
—— Epidemic of, 113
—— in Soldiers, 234
—— Nature of, 472
—— Pathology of, 119
—— Treatment of, 114,
Transplantation Cases of, 47, 83, 182, 344
Treitel, Congenital Glioma of Retina, 139
Trichiasis, 97
Troitski, Cyst in Anterior Chamber, 345
Trousseau, Albuminuric Retinitis, 357
—— Chrysophanic Conjunctivitis, 116
—— Gonorrhœal Conjunctivitis, 116
—— Hydrochlorate of Hyoscine, 462
—— Retinitis before Albuminuria, 488
—— Santonate of Atropina, 222
Tuberculosis, of Choroid, 348
—— of Conjunctiva, 234, 343
—— of Eye, Case of, 434
—— of Iris and Choroid, 236
Tumor, Case of Cerebral, 245, 367
—— of Left Lobe, 363
Typhoid, Sequences of, 246
Tytler, Spasmodic Ectropium, 100

Uhle, Amblyopia after Stroke of Lightning, 242
Uhthoff, Chronic Alcoholism, 366
—— Immobility of Pupil, 144
—— Ophthalmoplegia Externa, 230
—— Reflex Immobility of Pupil, 84
—— Sight and Intensity of Illumination, 92
Ulrich, Choked Disc, 243
Uveitis, 121

Valk, Astigmatism, 85
Valude Strabismus, 102
Vassaux, Chalazion Not Bacterial, 100
De Vincentiis, Iridotomy Ext., 478
Visual Field, 93
—— On Co-excitations in the, 317
Vitreous Body, Anatomy of, 464
—— Anomalous Formation in, 354
—— Hemorrhages into, 133, 486
—— Histology of, 91
—— Iris in the, 134
—— Reports on, 133, 354, 486
Vossius, Ophthalmoscopy, 80
Vulpian, Hemianæsthesia, 143

Wadsworth, Amblyopia of Squint, 468
Waehner, Basedow's Disease, 111
Wagenmann, Tuberculosis of Choroidal Tract, 348
Waldman, Ophthalmoplegia Externa, 106
Walter, Hyoscine, 468
Ware, Lupus of Lids, 467
—— Ossification of Choroid, 122
Warlomont, Cure of Retinal Detachment, 137
—— Twenty-five Years of Extraction, 131
Watson, Intraocular Gumma, 246
Webster, Badal's Operation, 339
—— Cataract Extractions, 354
—— Cocaine in Lid Operations, 477
—— Gun-Cap on Optic Papilla, 360
—— Steel in Lens, 360
Wecker, Antisepsis in Extractions, 85
—— Antisepsis in Orbital Operations, 112
—— Causes of Cataract, 130
—— Cysticerci, 142
—— Eserine Injections and Bandage, 222
—— Eserine in Extractions, 89
—— Injections and Bandages After Extraction, 132
—— Jequirity, 117
Weiland, Erysipelatous Amaurosis, 243
Weiss, Eyelid Tension, Effects of on Refraction, 228
Werner, Diplopia in Paresis of Ocular Muscles, 104

WEEKS, Bacteriological Investigations of the Antiseptics Used in Ophthalmology, 375
—— Ophthalmia Neonatorum, 345
White, Basedow's Disease, 341
Wicherkiewicz, Alopecia Totalis, 147
—— Bandage, 347
—— Ripening of Cataracts, 132
Wick, Brain Humor, 367
Widmark, Serpentic Ulcer, 475
Wiesner, Lymphangioma of Orbit, 232
Wild, Exophthalmic Goitre in a Family, 112
Williams, H. W., Cocaine, 476
Williams, R., Cysticercus in Anterior Chamber, 120
Wolfring, Catarrhal Conjunctivitis, 117
Wood-White, Cocaine, 121
Wools, New Series of, 221
Wuerdinger, Cocaine, 121
—— Comparative Anatomy of the Ciliary Muscles, 329

Zepler, Intermarriage and Congenital Blindness, 80
Ziem, Abscess of Lower Lid, 467
—— Abscess of Orbit, 470
—— Epiphora from Pharyngeal Affections, 246
—— Nasal Catarrh and Trachoma, 117
Zieminsky, Croupous Conjunctivitis, 234
Zonula, Anatomy of, 330